The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemical Education and Training

PROFESSOR PARTINGTON, in his letter to THE CHEMICAL AGE of last week, raised an old problem, but one which has to be faced again and again. There are now, as probably there always have been, those who regard education solely or mainly as a means of preparing the student for some particular job. The theory is good in the limited sense that business is a part of life, and that education, if it is a preparation for life, must of necessity be a preparation for business. But that is hardly the sense in which it is generally understood. There are commonly two sharply distinct views of the function of the school or college. In the one case education consists of the general training of character and mind—not merely the acquisition of facts, though that is an essential part, but the ability to apply them to any given circumstances; not only a mastery of general principles, but the power of seeing their application in any required direction. Trained on these lines, a student finally becomes an educated man, not in the sense that he is immediately qualified for this or that particular post, but because he can bring knowledge, sound mental habits, and trained judgment to bear on any work he may have to do. In a sense he is equipped for all rather than for any particular duties.

The more limited view is that the schools should turn out men, not generally equipped for any work on this broad basis, but specifically trained for some particular industry or vocation, so that when they become commercial clerks or mechanics or chemists or engineers they already half know their business. Commercial firms often favour this rather forced type of pupil. For the moment he is of more practical value than the other type trained on more liberal lines, but almost universally, in the long run, the latter travels farther and takes the more responsible positions. The difference is between education in the true sense and vocational or technical training in the much more restricted sense. It is a common complaint that much of our so-called technical education—evening classes, continuation schools, and so on—is wasted. The reason is that it is based on so poor a foundation. The experts, in our opinion, are sound who hold that premature specialisation generally leads to disappointment, and that more time spent on real fundamental work before specialisation begins pays far better. The institutions which teach chemistry are right, therefore, in teaching the student a sound knowledge of principles and leaving him to apply them in the way he thinks best.

To these rather obvious reflections may be added an opinion recently expressed to us by a very successful works manager, himself possessed of both chemical and engineering experience. When a young chemist enters a works he generally goes to the laboratory, where his associates are men of his own type and class. Too often they do their work in isolation from the general works staff. The engineer, on the other hand, usually goes to the workshops. Here he mixes with the real workmen, gets to understand their mentality, even, it may be, acquires a partial mastery of their own rich vocabulary. If he is of the right stuff, his superior education and breeding command respect, and while claimed as one of themselves is still looked up to. The different associations tend to produce different types. When the management are looking for a man for some administrative or supervisory position, in which the handling of workmen is an important point, it is but natural that they should look to the engineer rather than to the chemist. That is constantly happening. The chemist often complains of it. But in the circumstances the result is inevitable. Instead of keeping to himself the young chemist would be well advised to mix more with the workmen who are carrying out chemical

processes, to see the practical applications of his theories, and to get as full a knowledge as possible of workmen and works practice. Only so can he hope to get his share of the responsible positions which now go so often to the engineer.

Neutral Sulphate Difficulties

A CONTRIBUTOR to the Coking Section of last week's issue of our contemporary, the *Gas World*, calls attention to some points in connection with the production of dry neutral sulphate of ammonia which we do not recollect having seen before. In discussing the problem of producing throughout the country a quality of sulphate which approaches the ideal from the chemical and physical standpoints, one is often apt to overlook the fact that manufacture is in the hands of an immense number of distinct undertakings varying enormously in respect of individual output, and each faced, perhaps, with a different set of conditions. If, therefore, we seek for a reason why the after-treatment of the material to produce the desired article has in many cases been quite unsuccessful, the explanation will probably be found in the fact that it has been unwarrantedly assumed that what is suitable treatment for one class of salt is likewise suitable for all other varieties.

As the writer referred to above points out, the sulphate produced by some undertakings is that resulting from the distillation of ammoniacal liquor, and it is a comparatively simple matter to obtain a large, well-defined crystal which readily lends itself to the neutralisation and drying processes. When we come to the coke-oven undertakings, however, we find that in many cases the salt is produced by the modern direct or semi-direct methods; and owing to the more violent agitation in the scrubbing saturators employed with these methods large crystals have little opportunity to form. Accordingly, the salt consists of very much smaller crystals. These latter processes also present the disadvantages that the sulphate is formed in a bath carrying from 7 to 8 per cent. of sulphuric acid, which again affects crystal size and also introduces difficulties when centrifuging. It is found, for instance, that the salt builds round the basket of the centrifugal and thus precludes efficient drying, while it is much more difficult to penetrate the semi-permeable mass afterwards with the washing or neutralising agent. It follows, then, that while one of the common methods for producing a neutral salt by washing with ammonia liquor during drying is quite effective with still-produced sulphate, it has to be left out of serious consideration when direct or semi-direct methods are employed.

It is interesting to learn that quite a number of coking plants have now in use a type of dryer which was formerly employed in cordite manufacture. In such cases neutralisation is usually effected by the addition of soda ash; but this treatment involves the introduction of inert matter which proves a great handicap in the quest for 25½ per cent. (ammonia) material. An exposition (such as the contributor to our contemporary makes) of the difficulties which result from the installation of the modern direct processes opens up the big question as to whether these processes, in spite of the saving in operating costs which they effect as compared with the liquor-distillation methods, really pay in the long run. Many of our readers will recall that the late Mr. Curphey, when Chief Inspector under the Alkali Acts, made a close study of the new methods, and he gave some very convincing proof as to the losses they were found to involve.

The Chemist in Industry

DURING a visit this week to the Ipswich works of Messrs. Ransomes, Sims, and Jefferies, Ltd., to witness some demonstrations of the uses of their new electric "runabout" crane, an interesting example came to our notice of the commercial value of the chemist in industry. The firm are widely known as one of the oldest engineering concerns in the country, and a high and uniform standard of reliability in the metals used is of the first importance in the class of machinery they manufacture. Discussing some points in the organisation of the works with Mr. Pawlyn, one of the directors, we inquired as to the extent to which metallurgical chemistry was relied on. It has, of course, long been recognised in a general way, but it was only during the war (when first-class material was often difficult to obtain in many of our industries) that the firm installed their own works laboratory. The experiment, it was gratifying to hear, has completely justified itself. For a time there was the usual feeling on the part of some of the staff against being "taught their business" by a chemist; but that familiar prejudice soon gave way to a sense of appreciation, and has now been succeeded by an excellent working understanding. Where flaws or weaknesses are revealed in the course of searching trials and experiments, it is the practice to submit them to a chemical "inquest." In this way valuable knowledge of structure and other properties has been gained, and the firm's confidence in the quality of the materials used is based on the solid ground of their own scientific research and tests. Here, then, is one typical case in which the metallurgical laboratory was introduced as an experiment, and has proved so valuable as to be regarded as an indispensable part of the works organisation. The experience of a firm of this class carries conviction, and is a good object-lesson in the economy of expenditure on an efficient chemical service.

Another Referendum

A RECENT referendum taken by the Manchester Chamber of Commerce showed that even a greater majority of its members were opposed to the Dyestuffs Act than to the Safeguarding of Industries Act. This was, at the time, a surprising result, and it was suggested that the textile trade of Lancashire was severely affected by the present methods of applying protection to the British dye-making industry. With a view to ascertaining rather more closely the trend of opinion among the people most directly concerned, the *Manchester Guardian Commercial* has within the past fortnight invited some 1,150 firms in the textile, paint, and paper-making trades to reply to the following two questions: Do you favour the repeal of the

Dyestuffs (Import Regulation) Act? If so, are you in favour of a subsidy or other assistance being given to the British dye industry? Definite replies were received from 664 firms. Inconclusive replies or long letters of explanation were sent by several other firms, but these have been excluded from the following analysis of the result:—

	Textile	Non-Textile	Total
A. Votes in favour of the repeal of the Act	479	48	527
B. Votes against all protection of the British dye industry	168	27	195
C. Votes in favour of a subsidy or some other assistance being granted as an alternative to the Act	307	22	329
D. Votes against repeal	102	28	130
E. Majority in favour of repeal	377	20	397

A hostile vote in the home of Free Trade was to be expected, but it is significant that while 527 voted for the repeal of the Act, no fewer than 329 voted in favour of a subsidy or some other assistance being given as an alternative to the Act.

Acetylene Dangers

OXY-ACETYLENE apparatus is becoming so common and essential an auxiliary on all industrial works that we are, perhaps, inclined to let our familiarity with it make us indifferent to the dangers which it introduces if certain fairly obvious and simple precautions are not taken. There have been quite a few regrettable accidents with plant of the kind; but the ratio of accidents to the number of plants in use must still be extremely small, and there is no reason for works engineers and others to feel any apprehension about introducing the process. Our readers may recollect that some few months ago we drew attention to the official memorandum which was issued in connection with the construction and strength of cylinders for compressed oxygen; and it may be as well to emphasize the importance of a recent memorandum which has been issued by the Factory Department of the Home Office, and which deals most comprehensively with the dangers associated with the use of acetylene gas and with oxy-acetylene welding. It will be no exaggeration to say that if all those who employ acetylene apparatus were to provide their operators with copies of this memorandum, and if they insisted upon the observance of the recommendations which are made, there would be little likelihood of mishaps occurring. One would not go so far as to say that accidents can be eliminated altogether, for the origin of some of the explosions which have taken place is decidedly mysterious. They seem, in fact, to have been of a spontaneous nature, and to have occurred when there has been no definite igniting agent, such as naked lights or defective electric switches. Perhaps the most important point from the chemical standpoint is that as copper when in contact with acetylene forms copper acetylide, none of this metal whatever must be used in the construction of the plant or fittings. Copper acetylide, it is as well to recall, is a compound readily detonated by friction.

For the benefit of those who employ the oxy-acetylene flame we may mention that during our visits to chemical works we have been struck with the use which is now made of the oxy-coal-gas burner, and for such purposes as cutting thin steel plates and ordinary lead-burning it appears to present many advantages over acetylene. It would seem, therefore, that although acetylene is essential for certain operations where extreme flame temperature is required, it might well be substituted with coal-gas in many everyday operations.

Points from Our News Pages

New theories of valency are summarised in a special article by Dr. E. B. R. Prideaux (p. 138).

Reviews are published of recent chemical text-books (p. 140).

Preliminary notes are given on the dyestuffs to be exhibited at the British Industries Fair (p. 142).

Letters to the Editor deal with "The Case of the Young Chemist" and "Variations in Chemical Manufacturers' Prices" (p. 144).

A new process for the manufacture of sodium thiosulphate was described at a meeting of the Society of Chemical Industry in Manchester (p. 146).

The terms of appointment of Public Analysts were criticised by the President at the annual meeting of the Society of Public Analysts (p. 148).

According to our London Market Report business still continues very active, the inquiry for forward positions being well maintained (p. 154).

The receipt of a moderate number of inquiries accompanied by quiet business is recorded in our Scottish Market Report (p. 157).

Books Received

OUTLINES OF THEORETICAL CHEMISTRY. By F. H. Getman. London: Chapman and Hall, Ltd. Pp. 625. 18s. 6d.

THE THEORY OF EMULSIONS AND EMULSIFICATION. By William Clayton. London: J. and A. Churchill. Pp. 160. 9s. 6d.

BRIQUETTING. By Albert L. Stillman. Easton, Pa., The Chemical Publishing Co. London: Williams and Norgate. Pp. 466. $6.00.

DRUG AND CHEMICAL MARKETS BUYERS' GUIDE-BOOK, 1922–23 Edition. New York: Drug and Chemical Markets, Inc. Pp. 492.

The Calendar

Feb.		
12	Royal Society of Arts: "The Vulcanisation of Rubber." Henry P. Stevens. 8 p.m.	John Street, Adelphi, W.C.2.
13	Northern Polytechnic Institute Chemical Association: "Chemists." Richard Pilcher. 8 p.m.	Holloway, N.
13	The Institute of Metals (Scottish Section): "Some Phases of Lead Manufacture." John A. Sillars. 7.30 p.m.	Glasgow.
13	Society of Chemical Industry (Edinburgh Section): "Vitamins." Dr. G. M. Findlay.	Pharmaceutical Soc., York Place.
15	The Chemical Society: Ordinary Scientific Meeting: Papers by A. Chaston Chapman, R. H. Pickard and H. Hunter. 8 p.m.	Burlington House, Piccadilly, W.1.
15	Institute of Chemistry (Huddersfield Section): "Crystal Structure." Professor W. L. Bragg.	Huddersfield.
16	Society of Dyers and Colourists (Manchester Section): Paper by Dr. F. M. Rowe.	Manchester.
16	Society of Chemical Industry (Liverpool Section): "Synthetic Tannins." R. B. Croad. 6 p.m.	The University, Liverpool.
19	British Industries Fair.	London and Birmingham.

New Theories of Valency

By Dr. E. B. R. Prideaux

THE great advances in our knowledge of the structure of the atom have resulted in the formulation of a comprehensive and satisfactory electronic theory of valency. It seems probable that the full implications of this, when properly realised by chemists, will effect a revolution in ideas which have been accepted and standardised for the better part of a century.

The writer, in common with others, has been trying to follow the results of the new theory as presented in current literature and offers this short summary to readers of the CHEMICAL AGE in the hope that it may be of assistance to those who are much occupied in the technical branches of chemistry. It has been found that the chemical properties of the elements depend upon their atomic numbers. These are defined by independent physical evidence and agree in the main with the numbers obtained by counting from hydrogen in order of atomic weight. They confirm the periodic classification in the most unmistakable manner, by placing argon before potassium and by reversing the order of the atomic weights in other cases where this order would obviously place successive elements in the wrong groups.

A rough guide to the atomic number is to halve the atomic weight. According to theories of atomic structure the mass of an atom is made up of protons or positively charged hydrogen atoms (hydrogen ions).*

The number of these protons is equal to the atomic weight on the oxygen scale, and is rather greater than that on the hydrogen scale on account of the effect of condensation of the protons into a nucleus of very small dimensions (of the order of 10^{-12} cm.). Thus the oxygen positive centre contains exactly sixteen protons each of atomic mass 1·0076. Closely surrounding this centre (in the case of elements other than hydrogen) are about half the number of nuclear electrons which, with it, form the nucleus; and round this nucleus, at a much greater distance, are disposed the planetary electrons, the number and arrangement of which determine the chemical properties. In the uncharged atom the total number of electrons is equal to the number of protons. About half of the electrons are in the nucleus, and the excess positive charge, which is equal to the number of planetary electrons, is the atomic number. The helium atom has two planetary electrons, and this seems to be a particularly stable configuration, since no gain or loss of electrons by chemical combination is possible. In the elements from lithium to fluorine the atomic numbers correspond to a stable shell of two surrounded by a second shell of 3—2, 4—2, etc. This outer shell may gain or lose electrons by chemical combination. It is called by Langmuir the sheath. In the neon atom, number 10, another stable shell of eight electrons has been added, and in general the planetary electrons of the inert gases may be regarded as made up of successive stable shells.

	He	Ne	A	Kr	Xe	Nt
Atomic number ...	2	10	18	36	54	86
Stable shells	2	2, 8	2, 8, 8	2, 8, 8, 18	2, 8, 8, 18, 18	2, 8, 8, 18, 18, 32

The atomic numbers of the inert gases are given by Rydberg's formula: $N=2\Sigma\,(1+2^2+2^2+3^2+3^2+4^2)$.

Group Number	O	I	II	III	IV	V	VI	VII
Element....	He	Li	Be	B	C	N	O	F
N Atomic Number .	2	3	4	5	6	7	8	9
Planetary electrons .	2	3	4	5	6	7	8	9
E Chemical electrons in outer shell = N—2	0	1	2	3	4	5	6	7
	Ne	Na	Mg	Al	Si	P	S	Cl
N	10	11	12	13	14	15	16	17
Planetary electrons .	10	11	12	13	14	15	16	17
E=N—10 .	0	1	2	3	4	5	6	7

*These are probably, where the number permits, associated in groups of atomic mass 4—*i.e.*, that of the helium atom.

The postulate of octets states that the incomplete sheaths of all other atoms tend to complete themselves or to be removed.

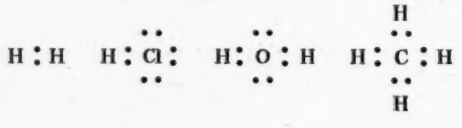
Metals, on the whole, tend to strip their incomplete sheaths, losing electrons and leaving the underlying stable shell. Non-metals and metalloids which chiefly occur in groups higher than 4 tend to gain electrons and complete their sheaths. Thus the lithium atom loses one electron to a chlorine atom leaving a positively charged shell of $2\ominus$ and giving to the chlorine a completed sheath of $8\ominus$ which is, of course, negatively charged. This is electrovalency. The lithium and chlorine atoms are held together, then, by electrostatic attraction only, and, with all other true salts, must be regarded as completely ionised whether in the solid state or in solution. This is electrovalency. The latest extensions of this part of the subject have been reviewed in a recent paper by Professor Partington.*

Applying the idea widely, oxygen or chlorine valencies are associated with loss of electrons and hydrogen valencies with gain of electrons, the resulting compounds being, according to Abegg, potentially, if not actually, ionised. The potential ionisation of compounds such as PH_3, CCl_4 has always been a difficulty, and these are now frankly recognised as non-polar or homopolar compounds, but are still embraced by later developments of the electron theory.

In these compounds it is considered that pairs of electrons or duplets are shared by two (or perhaps more) elements, giving a system which is not externally charged—*i.e.*, in which the fields of force are closed.

Thus the hydrogen atom, consisting of one proton and one electron, may lose the latter, giving a hydrogen ion, but it may also share the electron with another atom, either hydrogen, in which case the hydrogen molecule results, or chlorine, giving undissociated hydrogen chloride, or with carbon and other elements, giving non-polar compounds.

By this means the tendency of elements to complete their octets and of hydrogen to complete its duplet may be satisfied by this "covalent" combination which is represented by:



Abegg's normal valency in the metals up to group III is mainly electrovalency, and should be represented by a different symbol (see below). The normal valencies of elements from groups IV to VII may be either covalencies or electrovalencies; predominantly the latter in the higher groups VI or VII. Thus the hydrogens in hydrochloric acid and in water may be united by covalencies or electrovalencies according to circumstances. If E represents the number of electrons in the shell of an element, this number is identical with the group number, and 8—E is the hydrogen valency of an element from group IV to group VII inclusive (see table in column 1). It has been shown by Langmuir that the number of duplets or covalencies "p" which join together elements which are capable of forming octets is given by the equation:

$$2p=8n-\Sigma e$$

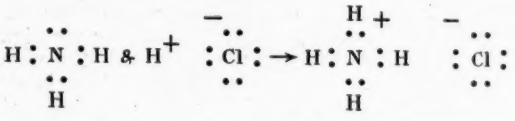
in which "n" is the number of octets, "Σe" is the total number of electrons on all the uncharged atoms.

It is interesting to apply this equation and the theory generally to ammonium compounds, quaternary bases, and also sulphonium, etc., compounds.

In the case of NH_4Cl there are two octet forming elements, so that $n=2$ and $\Sigma e=5+4+7$, therefore $p=0$; there are no duplets joining the nitrogen and chlorine. These either form separate molecules, as in the dissociated vapour, or the

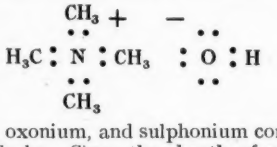
*The CHEMICAL AGE, Dec. 16, 23, 1922.

NH_4 and Cl are combined only by an electrovalence as in the solid or dissolved salt.

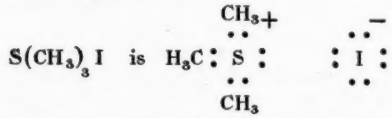


In ammonia, nitrogen is tercovalent with two free electrons. These are available for duplet combination with the hydrogen ion which has no electrons. The nitrogen is now quadricovalent; it does not differ from CH_4 in structure but carries a positive charge. It may seem curious that this should reside in one hydrogen; as a matter of fact it is usually represented as belonging to the group as a whole, which lacks one electron, because the sum Σe on all the electrically neutral atoms which should be 4+5 is only 8. The excess of positive electricity may oscillate between any of the angles of the regular tetra hedron at which the duplets are probably collected in this ion. The structures of tetralkyl ammonium compounds are precisely similar. It can be shown that each univalent radical can be treated as if E were 7 and n were 1—*i.e.*, as a halogen atom which can form one octet. Otherwise expressed, the end carbon atom of the radicle R has one free electron available for duplet combination.

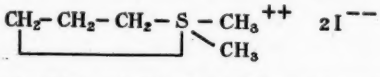
Thus the formula of tetramethyl ammonium hydroxide is :



Phosphonium, oxonium, and sulphonium compounds can be represented similarly. Since the sheath of sulphur contains six electrons, sulphines, etc., can only be dicovalent (as in undissociated SH_2). The molecule, however, can still add on charged radicles which have no free electrons. Thus :

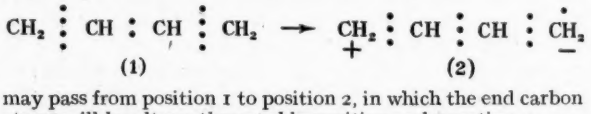


There are still two free electrons on the sulphur which should make it possible to prepare a quaternary diiodide. Langmuir quotes the case of trimethylene dimethyl sulphonium diiodide.



prepared by Grishkevitch-Trokhimovskii. It is, perhaps rather unfortunate that the dot or circle for the electron may be confused with one of the symbols for the single bond. In view of the occasional necessity of showing the complete duplets it may be supposed that chemists in writing structures may by a self-denying ordinance restrict themselves to the use of lines to represent the single bonds or duplets of non-polar compounds. The charges on atoms connected by electrovalencies should be represented by + or —.

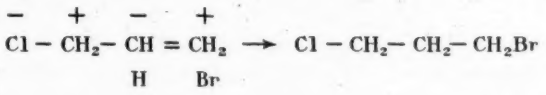
Double bonds in carbon compounds may be represented as oscillating between two positions. Thus butadiene



may pass from position 1 to position 2, in which the end carbon atoms will be alternatley weakly positive and negative.

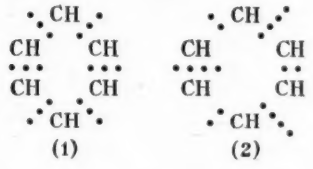
Quadricovalent carbon atoms are of necessity uncharged, but if they are united by duplets to atoms or groups with a very powerful tendency to form free octets, such as chlorine, the shared electron belonging to the carbon atom is strained towards the chlorine atom. The octet on this C atom being weakened on the side of the chlorine is also weakened by the attraction of the stronger carbon octet on the other side, and the atoms become alternately negative and positive (Kermack and Robinson, *J.C.S.*, 121, p. 427, 1922; also Lapworth, *ibid.*, 416, 1922).

Thus allyl chloride treated with HBr adds the halogen to the positive centre :



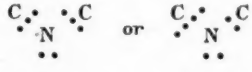
The triplet electron combination represents 1½ single bonds and the oscillation of valencies, and conjugation formulæ are represented conveniently by the movement of the single electrons or perhaps by the sharing of these.

Thus the structure of benzene may be represented by (1) corresponding to the Armstrong, Baeyer formula, or (2) corresponding to the Kekule formula :



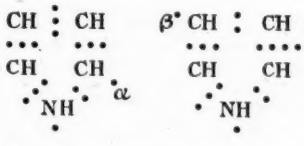
The fourth electron on its way from structure 2 to structure 1 may confer momentary polarity of the same sign on the alternate carbon atoms, as shown in the case of the butadiene. By substitution of a negative group on a positive carbon the alternate polarities are fixed as negative in the ortho and para positions and determine the positions of succeeding substituents (Lowry, Chemical Society Abstract, in this Journal, October 28).

Pyridine may be represented by the two benzene formulæ, the nitrogen atom being



and becoming quadricovalent in the formation of salts exactly as shown in the case of ammonium chloride, except that the positive charge will probably remain at the one basic centre.

The carbons in benzene and pyridine have no permanently free or unrestrained electron, but it was pointed out by Kermack and Robinson (*loc. cit.*) that pyrrol has one which accounts for the reactivity of the α and (sometimes) the β position.



It will be seen from these few examples that the electron theory in its present form is capable of explaining many valency puzzles of long standing. It meets, of course, with further difficulties, but in order to explain these further extensions of the theory can be made. Thus it is suggested that one electron may be shared in common, as in the case of phosphorus pentachloride, or one atom may share a duplet with two atoms, thus holding them together, as in the case of hydrogen fluoride H_2F_2.

"A Treasure House of Information"

As a further example of the favourable opinions received respecting *The Chemical Age Year Book*, we publish the following letter, dated January 25, 1923, received from a chemist at a Government Experimental Station :—

"May I take this opportunity of expressing my thanks for and appreciation of *The Chemical Age Year Book*, which I received this morning. I was really astounded by the value and usefulness of the volume. It is a real treasure house of information to anybody who is in any way connected with the chemical profession. Personally I find it indispensable."

Reviews

THE THEORY OF ALLOTROPY. By Dr. A. Smits. Translated by Dr. J. Smeath Thomas. Longmans, Green and Co. 1922. Pp. vii, 397. 21s. net.

In our early student days we were introduced to the "allotropic modifications" of carbon, sulphur, mercuric iodide and a few other substances as amongst the curiosities of chemical science. It was then not suspected that allotropy was a phenomenon practically coextensive with chemistry itself. Yet such is now known to be the case, and a knowledge of the theory of allotropy is essential to the chemist before he can be regarded as adequately equipped for his work.

The foundations of the subject were laid by Willard Gibbs in his monumental work on the Phase Rule. The superstructure is largely the work of Dutch scientists. Dr. Smits is numbered amongst the master-builders. British scientists have not hitherto taken much part even as hodmen in the building operations. Why should this be so? It may be urged that the subject is one that does not commend itself to the British scientific temperament. A similar plea has been advanced in more than one connection—among others, to *explain* the migration of the dye industry from England to Germany—and could be readily refuted, did space permit. We would suggest that the root cause for the neglect of this and allied subjects lies in a defect in the training of chemists in our schools and universities. A clear understanding of the phase rule and its developments demands a thorough acquaintance with branches of mathematics and mathematical physics—more especially with solid geometry and thermodynamics—which are generally slurred over, if not entirely neglected, in our college courses. The chemist desirous of mastering the phase rule requires something more than the proverbial "algebra to quadratics and the first four books of Euclid," supplemented by a hazy notion of the calculus and a nodding acquaintance with Carnot's cycle. Thermodynamics must be studied from the standpoint of thermodynamic potentials. The subject must not be dropped when the student is able to give a halting explanation of the existence of a triple point in the system ice-water-steam. The standard of attainment necessary that profit may be derived from a study of the work under review is very much more than that.

The book is divided into a theoretical and an experimental section. In the former, the principles of the theory and the mode of representation of systems by means of equilibrium diagrams are briefly, and, in the reviewer's opinion, not very clearly explained. The presentation is adequate for the expert. Other chapters in the first section are devoted to pseudo-ternary systems, systems containing a liquid crystal phase, allotropic substances in the presence of a solvent, the application of allotropy to electrochemical and photochemical equilibrium, and the interpretation of the Röntgen spectra of crystals. The experimental section is devoted to the examination of the theory from the electrochemical standpoint, and its experimental verification by means of non-electrical transformations such as fusion, volatilisation, etc. An account is given of Professor Brereton Baker's work on perfectly dried substances, which is interpreted as establishing the complexity of unary phases. It is incorrect to state, as in the preface, that a special *chapter* is devoted to this work.

The reviewer's impressions on reading the work may be summed up thus: the volume will be of value principally to those already *thoroughly* familiar with the applications of the phase rule; it will be of little value to those commencing the study of the subject. There is a gap in English literature on this subject, which is not adequately filled by Findlay's admirable work on the Phase Rule, published in the same series as the present volume. In the matter of detailed criticism there is little to offer. In a future edition it would be desirable to employ the customary notation of partial differentiation, and to replace, throughout the volume, the sign of proportionality ($\propto$), by the sign for infinity (∞) where the latter is intended. The notation employed in the volume should be explained in detail. Certain expressions occurring in the work, *e.g.* "coefficients of direction" on p. 39, and "bad solvent" on p. 112 are the result of too literal a translation of the original. "Temperature" in line 9 of p. 19 is written where "pressure" is intended.

The editor, Professor Donnan, and the translator, are to be congratulated on the completion of their long tasks. They have deserved the thanks of British chemists for rendering Dr. Smit's work more easily available.

J. S. G. T.

CHEMISTRY OF TO-DAY. By P. G. B., M.A. London: Seeley, Service and Co. 8s. 6d. net. Pp. 311.

This volume forms one of the "Science of To-day" series which has for its object the explanation of various scientific principles and problems in a popular and interesting manner. The author tells us in his introduction that the book is not in any sense a text-book; but if we accept a text-book for what the dictionary calls it—namely, "a book containing the leading principles of a science"—then we can certainly say that Mr. Bull's volume is a text-book of an unusually agreeable nature, for he has given us many of the leading principles of science without encumbering them with obscure formulæ and dull technical matter. Purely from the educational standpoint one is often set wondering why a student who has attained the requisite standard of proficiency in his everyday "groundwork" subjects, and who is just ripe for being led along more specialised paths should be faced at the outset with the bald statements of facts such as we find in the orthodox text-book. There is a considerable amount of romance connected with most of the sciences, and by deftly intermixing this romance with the basic scientific principles an appeal is made to the youthful mind, and there is every incentive to follow up the study of the subject. In the methods we employ in teaching the elements of a science there is, in fact, plenty of room for improvement, and there can be no doubt that if the "popular" style of book is really well written it can play an immensely useful *rôle* in our schools.

Mr. Bull has an unusually facile style, and the reader finds himself being introduced to sound scientific principles without really appreciating it. His volume, moreover, is particularly comprehensive, for it embraces practically all branches of chemistry—analytical and synthetic, and chemistry as applied to industry and art, including the chemistry of the stars as analysed by the spectroscope. The more intimate one becomes with chemical science the more one realises how limited is one's knowledge of it, and it is a salutary exercise to read occasionally through a popular volume and to take note of the great number of facts with which one was not conversant before. Since the days of Lavoisier, when the foundations of chemistry were well and truly laid, the advance has been rapid and unchecked. If we are to form any just conception of this progress we must extend our view of it into the uttermost horizons of human life and activity. We no longer believe that chemistry is bounded by any definite limits or restrained by any narrow environment. Every day, in fact, something is added to the conveniences and amenities of life as a result of chemical research Mr. Bull's volume assists in enlarging one's perspective, and it should prove of no little educational value even to the most well-informed of readers.

In his chapter xx, which deals with carbon and some of its compounds, the author refers to the sharp distinction

between the terms "organic" and "inorganic" which used to be drawn even up to a few years ago. The distinction was in great measure the result of the barrier which was erected between the living and the non-living. To-day, although we cannot say that that barrier has been removed, and that the origin of life has been discovered in the laboratory, yet we may affirm that the dividing line is not so sharp and distinct as it was once supposed to be. Whether life can be produced through the agency of chemical and physical processes is no concern of the worker in pure chemistry. The interest is centred in the domain of bio-chemistry and biology. But, be this as it may, the distinction between organic and inorganic compounds has certainly broken down very considerably, and many of the compounds of carbon can be produced artificially in the laboratory to-day quite independently of any so-called "vital force." C. A.

DYESTUFFS DERIVED FROM PYRIDINE, QUINOLINE, ACRIDINE AND XANTHENE. J. T. Hewitt. London: Longmans, Green and Co. Pp. 405. 14s.

Apart from the recognised technical value as dyestuffs of various classes of derivatives containing the pyridine and pyrone rings, the more recent application of several of such substances as photo-sensitisers and as antiseptics has added an increasing interest to these groups. A volume, therefore, which aims at the collection in compact form of the available literature concerning them, should be welcomed. As such, then, is Professor Hewitt's book primarily valuable, containing as it does a wealth of references dealing with a large variety of raw materials, intermediates, and dyestuffs of the above categories. The volume combines in some measure the functions of a useful practical text-book with those of a purely theoretical treatise of interest to all types of chemist. Thus, while the reproduction, with sufficient working detail, of important processes from the Patent and other literature will afford considerable saving of time to the technical chemist, the student and research worker should find much of value in the discussions of theoretical and structural considerations, such as the synthesis of quinoline and acridine, the constitution of the pyrone ring, of fluorescein and of the rhodamines, to quote one or two examples. Structural formulæ are employed with freedom, and matters of general theoretical significance are frequently pointed out.

It is unfortunate that a book containing so much useful matter should not be better produced. The very frequent occurrence of typographical errors, particularly in the earlier chapters, casts doubt upon the general trustworthiness of references and formulæ, and, indeed, several of these have been found to be inaccurate. References such as "Williams — — — — — — Hofmann — — —" (p. 55) are not particularly enlightening. In the same way, some of the punctuation is distinctly unusual, whereas in places extreme brevity has led to the adoption of a style more suited to a laboratory note-book than to a work of this nature. A name index and a fairly complete subject index are provided. S. E.

THEORIES OF ORGANIC CHEMISTRY. By Dr. Ferdinand Henrich. Translated and enlarged from the Fourth German Edition of 1921 by Professor Treat B. Johnson and Professor Dorothy A. Hahn. New York: Wiley and Sons. London: Chapman and Hall, Ltd. Pp. 603. 30s.

Dr. Henrich's book on *Neuere Theoretische Auschauungen auf dem Gebiete der organischen Chemie* has long been known to older students of organic chemistry, who are indebted to him for having produced a readable and attractive volume which afforded a refreshing change from the dullness of the ordinary text book.

Since its first publication organic chemistry has seen many changes, and, as the author says, its general theories are at present "in a state of violent transformation." As one might expect, the new edition contains a good deal of new matter which has been considerably augmented in the English translation; but the general character and interest of the book is well maintained and the new translation will no doubt find many readers. If a criticism might be offered, the choice and treatment of the subjects seem a little wanting in balance. In the American version, for example, a whole chapter has been added (with the author's sanction) on the elect on conception of valency, by the so-called American school of investigators, while two other chapters are allotted to the theoretical views of Michael and Nef respectively.

Whether or not the speculations of the American school are deserving of 90 pages of printed matter is largely a matter of taste. But it is noteworthy that the most important contribution to the electronic theory by Langmuir and its application to organic compounds by Lapworth and Robinson is omitted.

There are many other important omissions. There is no reference to the work of Senter and Drew on the Walden inversion, nor to the recent work of Thorpe and Ingold on Baeyer's strain theory, nor to the interesting experiments of Kenner on the replacement of groups in the benzene series, nor of the Braggs on the constitution of benzene, etc.

Then again, in the chapter on the application of physico chemical principles to organic compounds, a somewhat detailed account is given of refractivity; but rotatory polarisation is very briefly discussed and, most important of all, magnetic rotation in its relation to structure is entirely omitted.

The conclusion of the writer is that whilst Dr. Henrich has done justice to German theories and the translators to those produced in the States, the valuable theoretical work of English chemists has been overlooked. There seems no other way of accounting for these omissions.

J. B. C.

New Sulphate of Ammonia Prices

Another Advance of 5s.

FOLLOWING on the advance of 5s. per ton announced in December last for January-February deliveries for home consumption, we understand that the British Sulphate of Ammonia Federation has decided on a further advance of 5s. for home deliveries after the 24th inst. This will bring the price of neutral quality sulphate to £17 3s. per ton, while the ordinary quality will still remain 23s. per ton cheaper. The demand for home requirements still remains very active, and there is likely to be only a limited quantity available for export.

Chemistry of the Physiological Action of Drugs

MR. A. W. BURTT, in a paper read before the Chemical Society of the University, Birmingham, on February 5, on "Drugs and Poisons: the Chemistry of their Physiological Action," dealt firstly with different groups of the Periodic System, showing that in the main the effect on the animal body of any element is a characteristic property of the group to which it belongs. As an important instance of this generalisation, the lecturer referred to Salvarsan, pointing out that other members of Group V also possessed therapeutic properties similar to those of this drug. With regard to organic drugs it was shown that, given a certain nucleus, the action on the organism may be strengthened, weakened, or modified by individual substituents and that a knowledge of the constitution of an organic compound will in general give some indication of its physiological properties. The highly reactive radicles—amino, hydroxyl and carbonyl—all increased the intensity of the action, whereas acidic radicles—carboxyl and sulphonyl in particular—weakened the physiological properties; introduction of chlorine or bromine into a molecule tended to increase the poisonous properties, and the accumulation of ethyl groups about a nucleus was a condition for the production of sleep.

Dyestuffs at the British Industries Fair

New Products since Last Year's Exhibition

The following notes on exhibits in the Dyestuffs Section of the British Industries Fair indicate some of the developments during the past year which will be illustrated in the exhibits.

As in former years, dyes and dyestuffs will be well represented at the British Industries Fair which opens in London on Monday, February 19. It is often forgotten, when considering the vast dye industry which has been built up in Germany, that the production of the first synthetic dyestuff was a British discovery and that for a time after Professor Perkin produced the first colour—mauve—the industry was confined to the United Kingdom. It was only during the later years of the last century that it was gradually transferred to the Continent, with the result that at the outbreak of the war practically the whole of the world's requirements for dyestuffs were being satisfied by Germany.

So soon, however, as this impossible position was revealed by the war, steps were taken to re-establish the industry in Great Britain. The task is not an easy one, when the smallness of the resources at hand and the intricacies of the manufacture of dyestuffs are borne in mind, to say nothing of the efforts made by the powerful German chemical combine since the war to frustrate any efforts on our part in the matter, and to nullify any development which had been achieved during the period of protection afforded by the cessation of German supplies and activities during the war.

Range of Production

Nevertheless, if any evidence of real and sound progress and of the determination of British dye manufacturers backed by the Government to succeed in their task is required, it will be found in no small degree at the Fair. There are now about twenty firms engaged in the industry, including some half-a-dozen who specialise in intermediates, and among these firms the manufacture of numbers of all classes of dyestuffs in common use to-day is carried on, from sulphur black to indigo, congo red to indanthrenes, orange II to aliz sappirole, etc. In many cases the output is more than sufficient to meet home needs, and a substantial export trade, particularly to the Colonies, is being maintained even to-day, notwithstanding fierce German competition. It is also interesting to note that advancement has not been confined merely to the manufacturing side. Until recently the only accepted index of dyestuffs was a German volume, but there is in course of preparation at the moment by the Society of Dyers and Colourists a new colour index in English, which has many features not possessed by the German index and is in many respects vastly superior to it.

New British Made Dyes

At the Fair many new products will be shown which had not reached the commercial stage at last year's exhibition. There will even be one or two dyes which are superior to anything yet made in any other country, and as year succeeds year, and the different British Industries Fairs come round, there is no doubt but that the dye exhibits will take a more and more important part, until eventually they will represent the whole range required by British consumers, who will thus once more be free from the dread of a calamitous cessation of supplies in the unfortunate event of another war or of ever again being at the mercy of a foreign power.

One exhibit showing a valuable range of products should be of special interest to the buyer with an eye for conditions making for cheapness in production. The manufacturing firm have only three essential raw materials, crude benzol, nitrate of soda and sulphur, and by progressive stages, which will be illustrated by a show of samples in chart form, they make everything at their own works from the crude benzol to the finished dyestuffs.

Samples of products will be shown in their logical chemical sequence, commencing with the crude benzol and its purified constituents, benzene, toluene and xylene, then the nitro derivatives produced by means of one of the most up-to-date plants in the country, the manufacture of the necessary sulphuric and nitric acids being included in this exhibitor's operations. Reduction to mon-amines follows, aniline production being a speciality. The purity of the nitro and amido-products is claimed to be equal to that of the best German standards.

The next step which will be illustrated is to the dyestuffs. Sulphur blacks include M. Vidal's latest series, the members of which possess features especially attractive to the dyer of cotton pieces and yarns. Then will be shown para rosaniline base, and rosaniline base, roseines (magentas), amongst which will be excellent examples of what can be done in crystallisation. Colouring matters of the soluble and alkali blue class will be prominent.

Results obtained from the application of the various dyestuffs in practice will be illustrated by means of fabrics utilised in the general decorative scheme, while a collection of small patterns will serve well to explain points in detail.

The object of this exhibitor will be to represent the field of operations in the specific branch of chemical industry in a comprehensive yet simple and ready manner.

Another firm will exhibit a large collection of materials dyed with the colours they manufacture. These exhibits will include woollen, union and cotton piece goods; cotton, jute and other yarns; natural and artificial silk, leather of all kinds, including chrome tanned and vegetable tanned leather for shoes, harness, etc., and velvet leather for ladies' belts, bags and other fancy articles. There will also be shown colours for paper, wood-stains, varnishes, polishes, etc., as well as various intermediates for the manufacture of aniline colours.

Another exhibiting firm will show synthetic dyes for all purposes, soluble in water, spirit, oil, turpentine, fat, wax, acetone, amyl acetate and other solvents.

Among this firm's specialities will be nigrosine base, nigrosine (water, spirit and oil soluble); induline base for toning printing inks; induline for silk, wool and leather; chrysoidine, Bismark brown, acid dyes for wool, dyes and stains for leather, colours for boot polish—black, tan, toney red, ox blood, etc. Linsol colours (quick drying) for printing inks, typophor colours for double tone inks, colours for writing, ruling and endorsing inks; harmless for confectionery, and acid proof colours for mineral waters, cordials and syrups; alkali proof colours for soap; woodstains; colours for spirit and oil varnishes; dyes for cotton silk,, coir yarn, jute, hemp, etc.; fancy shades for candles, dyes for artificial flowers; bases and naphtha soluble colours for rubber; special butter colour, fast to light and acid, for margarine and edible fats, guaranteed under the Food and Drugs Act; colours soluble in creosote for wood preservatives; colours for cinematograph films; fancy shades for briar pipes and colours for lake makers.

Another exhibitor will show a range of " Benzarene " direct dyes for cotton, " Naphtharene " wool colours, and " Neochrome ' dyes for afterchroming on wool. An interesting range of fast chrome colours (phorochromes) for wool, by the single bath process, will also be shown. The application of these colours in the dyeing of wool, cotton, leather, fur, jute, silk and paper will be demonstrated, and specimens of this exhibitor's production of the specialised naphthalene intermediate products will represent an extensive range.

Manchester's Place in Chemical Industry

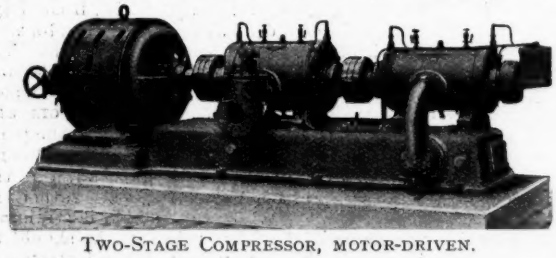
In the third of a series of articles on Manchester in *The Daily Telegraph*, attention is drawn to the intimate connection between this centre and chemical industry. It is pointed out that all the textile trades, as well as the majority of other industries located in Manchester, are necessarily clients of the chemical and dyestuff manufacturers. The first carbolic disinfectants ever manufactured were the product of a Manchester firm, and a very large trade still has its home in Manchester for the manufacture and supply of disinfectants and antiseptic fluids, millions of gallons of which were supplied to the British forces during the war. Another chemical industry flourishes in Manchester—the manufacture of sheep dips, for which Great Britain has for forty years held the premier position in every sheep-breeding country in the world. Manchester is the centre of the manufacture of synthetic dyes, for the further development of the trade in which the Ship Canal and the adjacent unrivalled sites in Trafford Park open a wide door.

Design of Air Compressors

The Rotary Cellular Type

At the present time there is a strong tendency in machine design towards the adoption of purely rotary as opposed to reciprocating motion, with the attendant very big advantage of high speed and perfect balance.

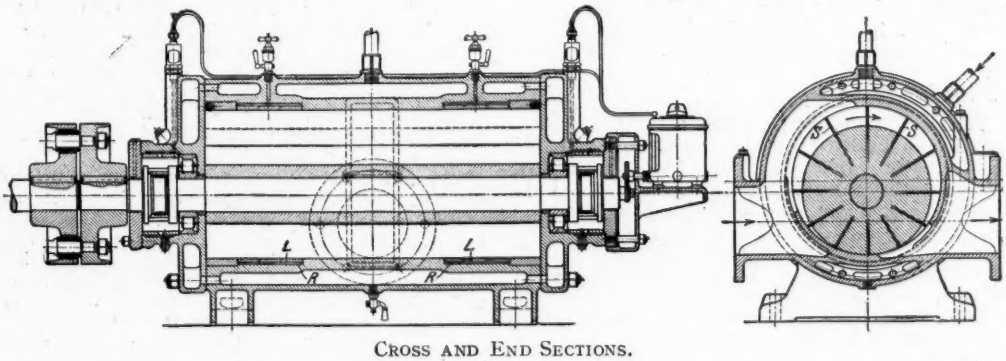
An interesting example of this is the rotary air compressor of the cellular type manufactured by the Swiss Locomotive and Machine Works, for whom Messrs. Bernard Holland and Co. are the British representatives. The rotary cellular compressor consists essentially of a fixed horizontal casing or stator, in which is revolved eccentrically a rotor fitted with light hardened steel blades free to move radially. The



Two-Stage Compressor, motor-driven.

crescent-shaped space between the casing and the rotor is thus divided into a number of cells corresponding to the number of blades of the rotor. As the machine rotates, each cell, starting from a minimum cubic capacity, grows to a maximum and then decreases to a minimum again, thus producing the suction and pressure effect of the machine.

The arrangement described is not new, but in the earlier types of machines the friction of the rotor blades against the casing was so considerable as to preclude high speeds. The particular machine in question is worthy of note for the very ingenious patented device which completely overcomes this difficulty. In this the centrifugal stresses of the blades are taken by a pair of floating rings carried in the casing and which revolve with the blades.



Cross and End Sections.

By this arrangement the friction is almost entirely neutralised, reducing wear and tear to a minimum and permitting the peripheral speed of the rotor to be increased to a speed suitable for direct coupling to electric motors without producing any appreciable wear. The machines are run at speeds of 500 to 3,000 revolutions per minute, depending on the size, and will run for several years with the same set of blades. The number of blades fitted varies with the size of the machine and the pressure to be obtained.

The floating rings (L) require great care in manufacture; the inner diameter is made somewhat smaller than the bore of the casing, so that, after taking into consideration elastic deformation due to centrifugal stresses and heat effects, practically the whole of the stresses are carried by the rings, and at the same time an adequately air-tight joint between the cells is maintained.

In order that the floating rings may move freely they are made with a certain clearance between their outer diameter and the casing. Leakage through this space is prevented by a series of small blades fitted in slots on the outside of the rings, and a balance of pressure between the inner and outer parts of the rings is obtained by means of small holes drilled in the rings.

In rotary compressors, as well as in those of the reciprocating type, the pressure which may be commercially obtained in one stage is governed by the heat generated and by air losses. In practice the economical limit is found to be in the neighbourhood of 60 lb. per sq. in. In the case of pumps a vacuum of about 95 per cent. is the limit for a single stage. By compounding, these figures may be greatly increased, and two-stage machines are built for pressures up to 230 lb. per sq. in. or for vacuum up to 99·5 per cent.

The machines are water-jacketed and are fitted with easily accessible ball or roller bearings. They are particularly suitable for direct-coupling to electric motors, and, on account of their small size and weight, for portable plants or for installation where the available floor space is restricted. Other advantages of the rotary machines are that they have no valves and that they give a continuous flow of compressed air.

Dye Users and the Ruhr Occupation

Sir W. Alexander's Statement on the Situation

So much concern has been created among dye consumers through the Ruhr situation which has already resulted in the French occupation of the dyeworks, at Höchst, of Meister Lucius and Brüning, that the British Dyestuffs Corporation, Ltd., has issued a statement signed by Sir William Alexander, the chairman, explaining the position.

"We have been asked," it is stated, "what assistance we could offer to the British dyestuffs consuming industries in the event of difficulties abroad increasing and of the crisis being prolonged. We believe that the British dyestuffs industry can perform the same service to consumers as during the war and the armistice period should the supply of dyestuffs again become restricted, and can offer a sufficient range of dyestuffs, of proper quality and in adequate quantity, to sustain the consuming industries through the difficulties which may face them. The British industry is in a much better condition to render this assistance than during the previous period of trouble because of the continuous attention which has been given to scientific and technical development."

Mr. F. T. T. Reynolds, chairman of the Chemical and Dyestuffs Traders' Association, has also made a very interesting verbal statement. The most serious effect of the French blow at the German dye industry was the possibility of shutting off supplies of high-grade dyes. If, he said, the authorities who were controlling the dyestuff supplies had given proper consideration to the matter they would have foreseen the danger of a sudden stoppage of supplies and would have taken care under the powers they possessed to accumulate an ample reserve of all the essential high-grade dyes that were being made here. So far this country had not taken anything like the full quota of the reparation dyes which she was entitled to. "The probability is," said Mr. Reynolds, "that there are stocks of German reparation dyes held by the British Dyestuffs Corporation, who are the official distributors, that should serve to satisfy immediate needs. In addition there is always a reserve of supplies from Switzerland which might well fill any gaps, and the United States can send supplies."

The Case of the Young Chemist

To the Editor of THE CHEMICAL AGE.

SIR,—The discussion in your most valued paper anent the training of chemists has been followed with much interest; my own is soon to be subjected to the usual tests.

As a recent graduate (B.Sc.), I am constrained to ask if the Universities do not treat chemistry more as an art than as a science? Are they not too practical, neglecting the general basis for niggling particulars? Do the examinations employed not make too great demands on the rather childish function of memory, neglecting the more adult one of "brains"? One is rather disposed to think so. For instance, organic chemistry is essentially practical (is it a science or an art?). Yet the student, whose actual acquaintance with, say, camphor ends with the smell, is asked to "synthesise" it—on paper. The chemist must understand the processes involved. He must overcome the difficulty in "splitting off water," and he must grasp the full significance of that all-embracing expression "gentle oxidation," and even, in extreme cases, "careful reduction," but it is just a question, how many pictorial strings of these reactions he must be able to write down before he can be said to "know organic."

What riles many students is the idea that the latent energy locked up in this mental reference book might better be employed in energising the intellect to a fuller grasp of the foundations of the science. Why not make the student think and calculate instead of emulating the parrot? Teach him how his science is based on physics and thermo dynamics. Show him that physical chemistry has other uses besides the determination of molecular weights. Teach him how to get facts from the reference books and perfect his dexterity, if he has any. Do not turn his head into a card index, but into a synthetic and analytical machine.

At the present stage of the science we must employ, what Professor Partington in his recent illuminating articles in THE CHEMICAL AGE calls, "sooty empirics," but do let them be subsequently useful if the student is asked to memorise them. That general principles are neglected in some cases is borne out by my overhearing a fellow graduate explain how the accumulators of electric trucks were kept charged by a dynamo attached to one of the wheels.

My plea is for chemistry as a science firstly, and as an art secondly, and do let it be a useful art, since it is by this department that the chemist hopes to live and serve his fellows.—Yours, etc. G.

Edinburgh, February 3.

To the Editor of THE CHEMICAL AGE.

SIR,—Being an annual subscriber to THE CHEMICAL AGE, and seeing the interest you have taken in "The Case of the Young Chemist," I take this opportunity of seeking your aid. I am a fully-qualified chemist, having passed the examination (in general chemistry) for the Associateship of the Institute of Chemistry last July, after the required University training. I am fresh from college and without experience, and, in spite of my professional qualification, I have been vainly endeavouring to secure an appointment during the last six months. I am now 22 years of age. I am writing on the chance that you may be able to advise me in this matter, and should be pleased to forward further particulars of training should they be required.—Yours, etc., H.C.

Hants, February 3, 1923.

Chemical Manufacturers' Prices

To the Editor of THE CHEMICAL AGE.

SIR,—With reference to the article on "Chemical Manufacturers' Quotations," page 119, February 3, 1923, it seems to us that the question raised by Mr. R. G. Johnston of Birmingham, is quite simple, as far as iodine, pot iodide, etc., are concerned at all events. If it was the same quantity quoted him in each case, no doubt some of the people he inquired from were makers and some were not, hence, necessarily, there would be a large difference in the price. Of course, if the quantities were not the same from each manufacturer, there would be a difference in price, whether a maker quoted or not, according to the quantity named.—Yours, etc.,

THOMAS TYRER AND CO., LTD.
THOS. TUCKER,
General Manager.

February 7, 1923.

The Chemist in Rubber Manufacture

Organisation of Technical Staff and Laboratories

AT a meeting of the Institution of Rubber Industry held at the Engineers' Club, Coventry Street, London, on Monday, a paper was read on "Technology in the Rubber Industry" by Mr. W. A. Williams, F.I.C., works manager of the North British Rubber Co., Ltd., in which the evolution of a technical staff and laboratories in a rubber manufacturing business was dealt with.

The author said it was only within recent years that the chemist had come into direct touch with rubber manufacture. His experience was that all the problems pertaining to manufacture that required investigation found their way sooner or later into the hands of the chemist or physicist, becoming a problem for the laboratory to deal with, and the results were applied through their agency, to a manufacturing scale. The success of a technical and scientific department in a factory organisation was essentially and solely dependent upon the men who composed the staff. The scientific investigators and advisors must be really able men, and he emphasised the point that the cheapest man was not necessarily the best investment. He did not think the specialist was of any great value in the problems that arose daily in a rubber factory but rather the man whose knowledge was founded on broad scientific training, with chemistry as his special subject; in fact, he should be well grounded in chemistry and physics and the factory and laboratory training that followed after his engagement, would then give him the necessary outlook on the problems that presented themselves and make him an efficient works chemist.

Co-ordination with Factory Operations

Turning to the organisation of the laboratories and their co-ordination with the factory operations the author outlined an organisation to meet the requirements of a large plant where the volume of work was considerable, although it could be adapted to smaller factories, in as much as in cases where the work was not extensive, certain sections could be grouped together or even dropped out where the demand was non-existent. The laboratory sections and full organisation were stated as follows: Chemical research laboratory; physical research laboratory; chemical routine laboratory; physical routine laboratory; mixings control laboratory; experimental laboratory; power, fuel and boilers laboratory; contracts and specifications laboratory; specifications and supplies link; work planning department. The detailed duties of these various branches of the organisation were then described.

There were, however, problems which could only be dealt with by concerted action and in this connection the lecturer called special attention to the fact that the Research Association of the British Rubber and Tyre Manufacturers' Association was now in active operation, his object in mentioning this being, he said, to emphasise the necessity of broad research for the improvement of both methods of manufacture and products, as the success of an industry depended upon its ability to command the application of improvements and reduced costs, which, in these days, could not be achieved by rule of thumb methods.

A discussion followed the reading of the paper in which Dr. P. Schidrowitz, Mr. Herbert Rogers, Mr. Fordyce Jones, Dr. Frederick Kaye and others took part.

Judgment in Secret Dye Process Case

IN the King's Bench Division on Monday, before Mr. Justice Acton, a dispute in connection with a company promoted to exploit a secret process for procuring aniline dyes from coal tar, gave rise to an action in which Mr. Jackson Calvert, manufacturing chemist, of Huddersfield, sued Mr. Henry Ellison, of Gomersal, for £2,000 damages for alleged breach of contract in connection with an agreement to finance the undertaking in question. The defence was a denial that the plaintiff had any new or secret process, and the defendant said he had not neglected or refused to perform the undertaking agreed to. At the resumed hearing on Thursday, Mr. Justice Acton found that there had been no breach of the agreement by the defendant, and even if there had been a technical breach of the defendant's obligations there was no proof that any damage accrued to the plaintiff personally. He therefore gave judgment for the defendant, with costs.

Liquid Air Rectification Plants

Theory of Causes of Explosions

THE February meeting of the London Section of the Society of Chemical Industry was held on Monday, Mr. W. J. U. Woolcock, presiding, when papers were read on " Explosions in Liquid Air Rectification Plants," by Dr. E. Fyleman, and on the " Estimation of Fat in Casein," by Messrs. G. T. Bray and F. Major. In the first paper Dr. Fyleman described experiments having for their object the determination of the reasons for the violent explosions which occasionally occur in liquid air rectification plants. He explained that in the rectification columns employed for the production of commercial oxygen and nitrogen, there were maintained baths of liquid oxygen and of liquid air, which were an essential feature of the rectification as carried out to-day. It had been found that these baths of liquefied gas were the seat of occasional explosions of very great violence, which occurred erratically, without any very obvious cause. In order to avoid danger to employees it was customary nowadays to instal the rectifying columns in deep pits so that the seat of the explosions was well below the floor level; but that, of course, did not prevent the material damage.

Incomplete Combustion

There having been a general view that the explosions were due to the introduction into the rectifier of acetylene, Dr. Fyleman was asked by the British Oxygen Co., Ltd., to endeavour to ascertain the cause. After a number of unsuccessful experiments, it occurred to Dr. Fyleman that acetylene is formed by the incomplete combustion of organic matter, as in the old method of preparing it, before the days of carbide, and he thought of the possible effect of highly compressed air, possibly heated through faulty lubrication on the compressor oil. Accordingly an iron kettle, about 4 in. wide and 6 in. high, was provided with a lid screwing down on to a copper washer, and into the lid were fitted a thermometer sheath, a gas inlet tube, and a gas outlet tube leading to a cooling coil. Samples of compressor oil were placed in the kettle and a current of oxygen passed through whilst the coil was being gradually heated, there being no immediate facilities for working at high pressures. At about 315° C. explosions could be heard in the kettle, and acetylene, or something very like it, was evolved and formed a yellowish silver salt, the colour being probably due to the presence of diacetylene. The precipitate was filtered, washed with dilute ammonia and dried, and on stirring gently it exploded violently. The experiment was then repeated in a current of air instead of oxygen, but no acetylene could be detected, but the oil residues left in the kettle were heated in a current of pure oxygen. At 280° C explosions occurred, and the yellow silver salt was again formed, which detonated on washing and drying. Subsequently, several experiments were made by heating compressor oils in air at ordinary pressure, but in no case was acetylene formed.

Acetylene from Outside Sources

A more powerful reaction vessel was then used to experiment at higher pressures, and in a rapid current of air at 30 atmospheres it was found that acetylene was produced when the oil attained a temperature of about 350° C., but not below that temperature. These results, said the author, satisfactorily explained how acetylene gets into the liquid air plant, even though the ingoing air may be beyond approach in quality, and the trouble from explosions had since been obviated by care in seeing that neither the lubricating oil nor the air in contact with it reached a temperature of 300° C., or upwards, by keeping acetylene from outside sources away from the plant and by using a suitable oil.

How a mixture of solid acetylene and liquid oxygen, when present in the sparator, was detonated, was not yet clear. Incidentally, the author mentioned that passing the gases through a composition of alkaline permanganate to which had been added silver salts freed them from any traces of acetylene, and this might be regarded as a second line of defence, athough the British Oxygen Co. had found the precautions already mentioned adequate to prevent explosions.

A discussion ensued, in which Drs. W. R. Ormandy, J. A. Harker, Symons, Dvorkowitch, and Thorn, and Messrs. Napier-Prentice and Horner took part, and to which Dr. Fyleman replied.

Estimation of Fat in Casein

In this paper the authors stated that a sample of Indian casein in which they had determined the percentage of fat by the Werner-Schmidt method to be 7·4, had also been examined by Gangolli and Meldrum in India, who found 0·24 using the Soxhlet ether extraction method, and subsequently confirmed their figure by the use of a new " absolute method " which they had devised. The difference being of such a fundamental nature the published methods for the estimation of fat in casein were reviewed at the Imperial Institute, with the result that it was shown that the Werner-Schmidt method gave the most satisfactory results.

Experiments were described showing that the fat is not completely extracted by ether from dry casein, using a Soxhlet extraction apparatus, even after a period of 31 hours. Concordant results were not readily obtained by the Rose-Gottlieb method; the results were low compared with those found by the Werner-Schmidt method, and in the former method it was often difficult to get the casein to dissolve satisfactorily in the dilute ammonia, even on warming.

Advantages of the Werner-Schmidt Method

The Werner-Schmidt method was found to give concordant and the most reliable results. According to the details recommended by the authors, the casein is dissolved by warming with four parts of hydrochloric acid (sp. gr. 1·16) and two parts of water for 40 minutes in a boiling bath prior to the solution being extracted in ether, the ether extract being extracted with petrol to isolate the fat.

The contention that the fat obtained by this method contains products of the hydrolysis of the casein, and that this method therefore gives results that are too high, was shown to be wrong. Experiments carried out by the authors showed that more favourable conditions for the hydrolysis of the casein did not influence the percentage of fat obtained, and also that the petrol soluble matter (fat) obtained did not contain sufficient nitrogenous hydrolytic products to vitiate the accuracy of the estimation. Further experiments were then described to prove that the Werner-Schmidt method was the most reliable. The method as recommended by Gangolli and Meldrum, was shown to be unreliable and to give low and inaccurate results, as by their method the fat was not completely extracted. The casein did not dissolve satisfactorily in the caustic soda solution used, and it was found that the whole of the fat was not removed completely by the one extraction with ether, which, according to the details of the method was stated to be sufficient.

Messrs. Salamonson and Freeland took part in the short discussion which followed the reading of the paper.

German Potash Sales

DEALING with conditions in the German potash industry, the *European Commercial* states that during the first ten days of January it was found that only 14,100 tons of pure potash were supplied to purchasers, as compared with 144,800 tons during the whole of January last. The number of orders on hand at the Kalisyndikat is few, and it is expected that the total sales of the month will prove to be only a small fraction of those in January, 1922. This weakened purchasing power of German agriculturists is due, the journal states, to the fact that in the last quarter of 1922 prices for potash in various forms rose six-fold. The main causes for this rapid rise were increased wages, coal prices, and railway freight. Despite the decline of sales, it will be necessary, however, to make a further advance of price, as arbitration awards have led to a new increase of wages.

Irish Chemistry Students at Birmingham

RECENTLY the Senate and Council of the University of Birmingham received a request from the Royal College of Science, Dublin, to make provision at Birmingham University for eight senior students of chemistry who wish to do laboratory work, the commandeering of their *alma mater* by the Free State authorities having made it impossible for them to complete their studies in Ireland. The necessary arrangements were made for their reception, and all of them are now working under the supervision of the Dean of the Faculty of Science in the Chemical Department at the new University buildings at Edgbaston.

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Society of Chemical Industry

Joint Meeting at Manchester

A MEETING of the Manchester Section of the Society of Chemical Industry was held on February 2, Dr. E. Ardern, F.I.C., in the chair. Members of the Manchester Geographical and Mining Society, the Manchester Section of the Institute of Mechanical Engineers, and the Manchester Association of Gas Engineers attended by invitation.

The Manufacture of Sodium Thiosulphate

In a paper entitled " A New Process for the Manufacture of Sodium Thiosulphate," by Mr. Luke Hargreaves and Dr. A. C. Dunningham, it was stated that if sodium sulphite and sulphur were agitated with water in the correct proportions for forming a concentrated solution of thiosulphate, the rate of reaction decreased with increase of thiosulphate concentration. This had been shown to be due to the reduced reacting contact between the sulphur and sulphite. Different methods of increasing this contact were discussed. The most effective means of increasing the rate of reaction was to use a large excess of one or both of the solid reacting substances. By this means solutions of thiosulphate of sufficient strength to crystallise without concentration were directly prepared.

Various curves were exhibited showing that all ordinary impurities were only slightly soluble in concentrated thiosulphate solutions, so that after filtering or settling such solutions were of great purity. A commercial process was described for preparing thiosulphate in this way, and also a further development in which sodium carbonate, sulphur dioxide, and sulphur in the presence of water reacted simultaneously to produce a similar concentrated solution of thiosulphate.

Materials for Stone Dusting of Mines

Dr. A. C. Dunningham, in a paper on " The Factors Determining the Choice of Materials for Stone Dusting of Mines, with Special Reference to Carbonate of Lime," said that under the Coal Mines Act the stone dusting of mines had been made obligatory upon the colliery industry, the only practical alternative allowed being treatment with water. The regulation was based on the Reports of the Explosions in Mines Committee," in which it was shown that the presence of a sufficient amount of finely divided inert material would prevent or check explosions due to coal dust. The efficiency of a stone dusting material depended upon its capacity for rapid absorption of heat so that the explosive mixture did not reach a sufficiently high temperature for explosive combination to take place. The desirable properties of a stone dusting material were discussed from the chemical, physical and physiological standpoints. The physical properties were most important since the rate of absorption of heat depended mainly upon these. A large surface relative to mass such as was associated with an amorphous and finely divided material such as precipitated carbonate of lime was particularly good from this point of view. A white or light coloured material was also very desirable on account of its influence in lightening the mines and so tending to lessen the scourge of nystagmus.

Some Developments in Gas Producers

A paper by Mr. T. R. Woollaston on the above subject set forth, in the first instance, a statement of the average performances of gas producers of the recovery and non-recovery types at the time (some ten years ago) when the author's work commenced, and indicated briefly the causes of loss and inefficiency therein which appeared preventable. These causes were approximately and concisely shown by means of diagrams, in one of which it was assumed that a sulphate of ammonia yield of gross value 7s. involved 4s. production cost in labour, materials, and capital charges.

An experimental plant had been constructed of full normal size with a producer 9 ft. diameter, and a gasification rate up to 13 cwt. per hour. Its essential and novel features were :— (1) The introduction of the raw material through the retort in contact with hot outgoing gas whereby the fuel was semi-coked and the gas enriched. (2) The useful abstraction of radiant heat from combustion zones in an unlined producer. (3) (*a*) an annual boiler which raised all the steam required, and (*b*) a central cone, which, acting more or less as flash boiler, provided direct blast saturation and superheat. (4) A Duff grate with patent selective crusher roll ash discharge and hydraulic collection and discharge of ash by water circulation.

It was pointed out that pre-coking led to a wide extension of the range of common fuels available, to practical elimination of clinkering, to great ease and economy of working, and to the production of a gas of unusually high value.

German Nitrogen Industry

The Position from the German Point of View

THE Commercial Secretary at Berlin (Mr. J. W. F. Thelwall) has forwarded to the Department of Overseas Trade an extract from a Berlin paper which states that, in view of the demands of the Entente for the delivery of 60,000 tons of pure nitrogen, a survey of the present position of the German nitrogen industry may be of interest.

There are three large groups of nitrogen producers who are united in the Nitrogen Syndicate, Berlin. The sale of nitrogen has, since July, 1919, taken place in the name of the Syndicate, but for the account of its partners. The three groups are as follow: 1. The Badische Anilin- und Sodafabrik, with works at Oppau, near Ludwigshafen, and Leuna, near Merseburg. These works produce sulphate of ammonia and other kinds of saltpetre according to the Haber-Bosch process. 2. The so-called " coking-kiln " group, *i.e.*, the pits of the Rhenish-Westphalian industrial area (with only unimportant exceptions) amalgamated with the German Ammonia Sales Association, the Upper and Lower Silesian pits amalgamated with the Upper Silesian coke works, and the industrial association of German gasworks in which the municipal gasworks of Germany are represented. 3. The so-called Nitrate of Potash Group, namely, the Bayerischen Stickstoffwerke A.G., including the Trostberg Factories; the Bayerische Kraftwerke A.G., Munich, including the Margaretenberg Factory; and the Mitteldeutschen Stickstoffwerke A.G., Piesteritz. The Chorzow Factory, with a yearly production of about 30,000 tons pure nitrogen, has fallen to Poland.

The above-mentioned factories produce at present about 340,000 tons yearly of pure nitrogen, or 1·7 million tons of material. Before the war the estimated amount of pure nitrogen contained in this sulphate of ammonia produced by the German coking-kilns and gasworks was 110,000 tons. At present, however, in view of the shortage of coking coal, this by-product has greatly decreased. In addition to the shortage of coking coal and sulphuric acid, the fireproof stones necessary for the manufacture of the coking-kilns are already about 6,000 times as expensive as they were before the war. The production by the nitrate of lime works varies owing to the fact that they are partly dependent on water power, which varies in intensity. So far as the Badische Anilinwerke are concerned, they have, the report states, probably succeeded in manufacturing nitrate of soda quite as good and containing the same quantity of nitrogen as Chile saltpetre.

Shortage of Soda Supplies

Difficulty, however, is experienced in procuring soda, which, in view of the shortage of inland coal, can only be imported from abroad at very high prices. The Badische Anilinfabrik alone was obliged to import 100,000 tons of English coal during 1922.

However high the figure of 340,000 tons pure nitrogen may sound, Germany's nitrogen requirements are estimated at about 420,000 tons yearly. Production in the German works has begun to increase, and the report states that at least 50,000 tons more pure nitrogen yearly is now expected.

The chief anxiety of the nitrogen industry is stated to be the regulation of sales and the supply without friction of the present production to farmers. Some idea of the sums concerned in nitrogen sales in Germany to-day may be gathered from the enormous sum of 500 milliard marks yearly turnover which is booked according to the present level of prices by the Syndicate. Freights for deliveries to agriculture alone amount to 40 milliard marks. One truck of sulphate of ammonia (15 tons) costs to-day 4·2 million marks. A medium-sized estate of about 1,000 morgen has accordingly an item of expenditure for nitrogenous fertilisers of at least 13 million marks, in addition to items of expenditure for potash and phosphoric acid.

Coal Tar Dyes

Chemical Constitution and Antiseptic Action

In a paper before the Royal Society of Arts on January 31, Mr. Thomas H. Fairbrother and Mr. Arnold Renshaw gave an account of the work which they have been doing in regard to the relation between chemical constitution and antiseptic action in coal tar dyes. A large part of the paper was devoted to the chemical aspect of the work, and in order to make the character of the work quite clear, the authors gave a short sketch of the characteristics of the various dye groups.

As a convenient basis for studying the antiseptic action of dyes as a whole, the following classification was adopted :— The azo class ; the triphenylmethane class ; the phthaleins or pyronines ; the azines, in which were included those derived from diphenylamine, *i.e.*, thiazines, oxazines and safranines ; the acridines ; the sulphur dyes ; the oxy-ketone dyes ; dyes of the indigo class.

Presence of Amido Groups

Giving some general observations on the conclusions drawn from their work, the authors stated that dyes which show any marked antiseptic action amongst bacteria and protozoa, generally contain one or more amido groups in the molecule. The presence of amido groups is not enough to cause antiseptic action, but the absence of amido groups is enough to prevent any decided antiseptic action. The effect of the amido groups in the molecule can be modified, and even completely neutralised, by the presence of certain other substituent groups in the molecule, such as sulphonic acid, carboxylic acid groups, nitro-groups, substituted naphthalene or naphthylamine groups or by further alkyl or aryl substitution in the amido groups themselves, or alkyl substitution in the benzene nuclei.

Two observations are worthy of notice : in every case where decided antiseptic action is manifested, tautomeric change in the molecule is possible, and also, in every case of active antiseptic action, the dyestuff is a molecular dispersoid, whilst those dyes forming colloid solutions show very little tendency to antiseptic action.

The authors have held the view for a long time that the physical state of a body has much to do with the antiseptic action, and that if a dyestuff had a colloidal nature in solution, it was not likely to be an active antiseptic. It did not follow, however, that because a dyestuff was a molecular dispersoid it would show antiseptic action.

Experiments on Sewage

The paper then went on to show that some dyes exert a more selective action than others upon bacteria and protozoa and that selective action occurs in the coal tar dyes within limits which may be wide in some cases and narrow in others.

Experiments upon sewage have shown that Meldola's blue—ten pounds dissolved in 40 gallons of hot water—killed in 15 minutes the carchæsia and vorticella, which are responsible for the troubles due to bulking in the purified sludge. In a second experiment a further derivative of the Meldola blue class was found which killed paramœcia practically instantly in a dilution of 1 in 80,000 and within 2½ hours in a dilution of 1 in 160,000. From these experiments it was seen that the bulking could easily be remedied by the treatment with dyes of the oxazine class, and experiments were now in hand to ascertain the exact conditions for obtaining the biggest decrease in bulking coupled with the smallest interference with the rate of purification in the tank.

Agricultural Groups

Passing to agriculture, the lecturers pointed out how these experiments had introduced us to one of the applications of selective sterilisation. Previous work was referred to in which toluene and arsenious acids were used as the partial sterilising agents, without, however, a great measure of success. The authors' results, it was suggested, indicated that much more positive results could be obtained by using certain of the dyes of the oxazine class.

In the last section of the paper the application of the antiseptic properties of these dyes in preventive medicine was referred to and special reference was made to the use of auramine for diseases of the ear and nose, as well as for the treatment of skin operations.

Vulcanisation of Rubber

Effect of Chemical Reaction on Physical Properties

In the first of a series of three Cantor lectures on the "Vulcanisation of Rubber," delivered on Monday before the Royal Society of Arts, Dr. H. P. Stevens considered vulcanisation as a chemical reaction taking place between sulphur and rubber whereby a slow combination of the two proceeds under conditions corresponding exactly to other additive chemical reactions. While this combination progressed, he said, there were gradual changes in the physical properties. When the more complex changes came to be considered it would be found that the relationship of physical properties to state of vulcanisation as measured by the combination of sulphur and rubber was less uniform, and that the physical properties might show appreciable variation independently of the chemical composition.

The lecturer described at some length the experiments of the late C. O. Weber, who was the first chemist to endeavour to ascertain the relationship between the amount of combined sulphur and the time of cure. In spite of certain irregularities, due to experimental errors, Weber carried his work far enough to show that the combination of rubber and sulphur proceeded in the same manner as an ordinary chemical reaction, and that the higher the temperature the more rapid the combination. Weber's work was followed later by others, in particular by Spence who, in about 1911 to 1913, published a series of papers dealing with the rate of combination of sulphur and rubber during vulcanisation. From the work of Spence, it followed that the amount of sulphur combined with rubber was directly proportional to the period of heating, but that the physical properties, as measured by the elongation for a given load, were only approximately proportional and showed variations according to the type of rubber used for the experiment. If the amount of sulphur was reduced until there remained in the vulcanised specimen a sufficient residue of free sulphur, and not a mixture of rubber with excess sulphur, similar results were obtained, but at the stage when but little free sulphur remained the conditions were altered and the rate of combination with sulphur was retarded.

Under certain conditions, vulcanisation would take place at relatively low temperatures, and a series of curves obtained by Spence at temperatures varying from 50° to 75° was exhibited. These experiments were carried on for about three months, and during this period amounts up to 10 per cent. of sulphur combined with the rubber. The specimens were vulcanised in glycerin baths, the temperature being kept constant by suitable thermostats. The variation in temperature during the whole period of the the experiments was less than 1° C. The combined sulphur was estimated in the usual manner after removal of the free sulphur by exhaustive extraction with acetone. The rate of vulcanisation, as shown by the combined sulphur, was directly proportional to the time, and the curves exactly resembled those for vulcanising at the usual (technical) temperatures, such as 135° to 145° C. The results also enabled the velocity coefficient of the rubber-sulphur reaction to be calculated from the data at these low temperatures. Figures fluctuating between 2·61 and 3·12 were obtained, with an average of 2·84, and this compared with 2·65, the figures obtained at higher vulcanising temperatures, a very close agreement, having regard to the experimental difficulties.

Sir John Cass Technical Institute

Sir Thomas Holland presented the prizes to successful students of the Sir John Cass Technical Institute, Jewry Street, Aldgate, London, on January 31. The Rev. J. F. Marr, Chairman of the Governors, who presided, said the institute was still much in need of accommodation for the chemistry and other departments. Thirty-one students were engaged in research work during the session, and papers published by students and members of the staff brought the number of original investigations issued from the institute to 120. Twenty-five students were successful at examinations of the university during the past year, and of these six had gained the B.Sc. degree with honours in chemistry, and of the fifteen students successful in the City and Guilds examination, ten were in metallurgy. For the second year in succession the first prize of a silver medal was gained in non-ferrous metallurgy.

Society of Public Analysts

Mr. Ellis Richards's Presidential Address

THE annual general meeting of the Society of Public Analysts was held on Wednesday at the Chemical Society's Rooms, Burlington House, Piccadilly, London. The president (Mr. P. A. Ellis Richards, F.I.C.) after congratulating the Society on another year of prosperous existence referred to the interesting series of papers that had been contributed during the session, and discussed the work of the Society during the past year.

He described the progress that had been made in the supply of good and economical glassware and porcelain and the efforts made in this direction by the Special Committee of the Institute of Chemistry. It was highly satisfactory to note that British manufacturers of fine chemicals were now able to produce about 2,000 substances, and were making every endeavour to extend their lists. The quality of these British analytical reagents, in the vast majority of cases, had been found to be excellent, and prices showed decided improvement.

In connection with some of the recently advertised Public Analystship appointments, Mr. Richards criticised the terms and conditions offered, taking special exception to those where many samples were submitted to rough sorting methods by persons other than the Public Analyst, only those that were obviously suspicious being submitted to the latter. Such a procedure, it was pointed out, could in no sense guard the interests of the public in the way intended by the Legislature in framing the Sale of Food and Drugs Acts, whilst it rendered the proposed rate of pay to the analyst entirely inadequate. Chemists were urged to do all that lay in their power to educate the public and to make them realise the value of scientific work.

Manchester Chemical Trade in January

IN their report on the Manchester chemical trade during January, Sir S. W. Royse and Co., Ltd., state that the year opened with an improved inquiry for both home and export, which has been well maintained during the month, and there has been keen competition for the increased volume of business which has been placed. Prices on the whole have remained steady, but there is some anxiety as to the effect of the French operations in the Ruhr district on supplies of certain articles and on business generally. Sulphate of copper has been irregular during the month; some fair inquiries for export have been coming along, but only a moderate amount of business has resulted, whilst home trade requirements have been small. Green copperas has been in better demand, but values are low. There is a scarcity of brown and grey acetates of lime and little lots offering command full figures. Acetic acid has been realising higher prices, and this has affected acetate of soda, which has been in good request. More business has been passing in acetates and nitrate of lead with the strong position of the metal, and there is less disposition to sacrifice stocks. Carbonate of potash has had a better demand, but supplies on this side are ample and price is unchanged. Caustic potash also is more inquired for. Yellow prussiate of potash is in somewhat short supply and is firmly held. Prussiate of soda has been rather quiet and price a little easier. White powdered arsenic is in a strong position with an unsatisfied export demand; there have been some offerings of foreign makes, but these have not affected the market. Tartaric acid and cream of tartar have advanced, and good business has been done for delivery well ahead; stocks are low, and, on the whole, the prospects are better than for some time. Citric acid also has had a ready sale and has realised higher figures. Bichromates have been subject to severe competition through arrivals of Continental supplies. Nitrite of soda has been neglected, but chlorates have been moving off steadily, and soda in particular is stronger. Oxalic acid has had rather more inquiry and price is firmer. The export demand for borax and boracic acid has been good, but the home trade disappointing. Phosphate of soda has remained dull. Further reductions in alum and sulphate of alumina have failed to stimulate demand. Muriate of ammonia and salammoniac have been in steady call for export. Both bleaching powder and white caustic soda have been more in request for the home trade, and the latter has had an active shipment on foreign account.

Isolation of a New Element

Dr. Alexander Scott's Discovery

AT a meeting of the Chemical Society on February 1, Dr. Alexander Scott, in a paper on the "Isolation of the Oxide of the New Element," stated that he had isolated the new element "hafnium." He also showed specimens of the oxide in the form of a cinnamon-coloured powder.

In 1913 Dr. Scott received for analysis samples of a black sand from New Zealand, from which he extracted a cream-coloured sand containing 75 per cent. magnetic oxide of iron and 25 per cent. titanium dioxide. In further experiments with the titanium dioxide he invariably found small quantities of a highly refractory residue. He continued to collect these, labelling them a "new oxide," but, until a fortnight ago, did not further pursue his investigations. Thinking from the similarity of the compounds it made with potassium and fluorine to those of titanium and zirconium that it might be established as No. 72 in the atomic table of elements, he began to work as soon as he heard of the discovery by Coster and Hevesy (see THE CHEMICAL AGE, Vol. VIII, p. 98). By a series of determinations, he ascertained the atomic weight to be approximately 180 and the chemical characters to be those which x-ray spectroscopy would assign to "hafnium." As an act of international courtesy Dr. Scott has written to Coster and Hevesy offering to give them the opportunity of applying the x-ray method to his oxide.

The black sand deposit in New Zealand is stated to be over seven miles in length and of unknown depth, so that if "hafnium" is of commercial value it can be produced in bulk. From its analogies to titanium and zirconium, it may find use in the manufacture of incandescent mantles. Other industrial applications may possibly be found in the admixture of "hafnium" with paints, with tar composition for road-making, and for linings for blast furnaces.

German (Reparation Recovery) Act

IN the latest circular issued by the British Chemical Trade Association, members are advised that they should exercise care when purchasing goods from Holland. H.M. Customs have recently laid down a fresh ruling under the above Act that German goods purchased in Holland, upon importation into the U.K., are liable to the 26 per cent. duty unless they were actually in Holland and entered into the trade of that country prior to the date the order was given by the British importer. For instance, if an order is given to a Dutch firm and they pass it on to a German house (whether the goods are consigned from Germany direct to the U.K. or from Germany to Holland and thence to the U.K. is immaterial), they may be deemed liable to the duty under this new ruling. It will be seen that an importer might buy from a Dutch firm and pay the full value of the goods. The question arises, from whom is the British importer to obtain repayment of the 26 per cent. duty. In purchases from German firms Customs receipt for 26 per cent. of the total value is, of course, tendered and accepted, but it is hardly likely that Dutch firms will accept part payment by way of such receipt for it is certain the German Government would not recognise their claim.

It seems, the circular continues, that trade with Holland is bound to be seriously interfered with and already importers have had to produce evidence from their Dutch suppliers that the German goods exported by them to the U.K. were in their hands as stock previous to receiving the British order. The evidence asked for by Customs was the German invoice for the goods in question made out to the Dutch firm. This may not always be available, in which case it may be taken that Customs would consider the goods German and levy the duty.

In conclusion, the Association say it would be as well to state, when purchasing goods from Holland, that if the goods are of German origin evidence that they were the property of the Dutch exporter prior to receipt of the British order should be forwarded, and if they had not entered into the trade of Holland prior to receipt of the order, they (the Dutch exporters) must make arrangements with the German suppliers to accept the British Customs receipt of 26 per cent. as part payment.

From Week to Week

DR. J. C. M. BRENTANO has been appointed lecturer in physics at Manchester University.

DR. EUSTACE E. TURNER has been appointed demonstrator in the chemical department of the East London College.

THE ANGLO-ULTRAMARINE TRADING CO., LTD., announce their removal to Oxford House, 15, John Street, London, E.C.3.

DURING the first nine months of 1922 Germany imported 72,242,700 kilos of sulphuric acid, but only exported 9,674,600 kilos.

F. J. CARMICHAEL AND CO., chemical merchants, 17, Water Lane, London, have removed to 17, Philpot Lane, London, E.C.3.

LORD LEVERHULME has been elected president, and Sir Max Muspratt, treasurer, of the National Liberal Council for England.

Mr. W. H. LEES has been appointed to the board of Alfred Smith, Ltd., rubber chemical manufacturers, Excelsior Works, Clayton, Manchester.

A PROFIT of £142 on the year's working was reported at the annual meeting of the Seed, Oil and Cake Trade Associations at Liverpool on January 31.

EXTENSIVE DAMAGE was caused by fire on February 3, at the premises of John Peakand and Co., chemical manufacturers, Bridgewater Works, Wigan.

A VERDICT of "accidental death" was recorded at an inquest at Southwark on Tuesday on Dr. A. H. Fison, lecturer in physics at Guy's Hospital since 1906.

THE APPOINTMENT of Mr. W. G. L. Hope, A.I.C., as county analyst for Nottingham has been recommended to the Ministry of Health by the Notts. County Council.

DYEWORKS at Höchst, near Wiesbaden, owned by Meister Lucius and Brüning, were occupied on Monday by the French. The workmen are reported to have ceased work immediately.

THE READING of Sir Richard Redmayne's paper at the Royal Society of Arts on "The Base Metal Resources of the British Empire," originally announced for Tuesday has been postponed to April 20.

THE POSITION of the German dye combine will be discussed at a meeting next month, and it is reported that the capital of the Badische Co. will then be increased from one milliard to three milliard marks

AMONG the companies struck off the register on January 30 were :—The Central Zinc Co., Ltd.; London Sherardising Co., Ltd.; Manchester Coal Tar Products Co., Ltd.; and The Oxygen and Drums Co., Ltd.

TWO EMPLOYEES of W. and J. George, Ltd., scientific apparatus manufacturers, Birmingham, were on February 2 fined £5 each at Birmingham Police Court for the theft of various apparatus and chemicals.

MR. H. G. MAURICE stated at a Conference last week on the relation between scientific research and fishery problems, that it had been discovered that "insulin," the new remedy for diabetes, could be extracted from fish.

AMONG those who have accepted invitations to be present at the annual dinner of the Institute of Metals on March 7 are Dr. F. W. Aston, Sir Frank Heath, Sir Thomas Holland, Dr. T. E. Stanton, and Sir Joseph Petavel.

MR. C. F. CROSS, in a lecture at the Royal Institution, on February 2, said that the large quantities of cellulose in the form of vegetation and crop refuse, which were now being wasted, should be put to use in the solution of the liquid fuel shortage.

MR. M. HARRISON, vice-chairman of Hanger, Watson and Harris, Ltd., was entertained at dinner last week by the staff in honour of his election as president of the National Federation of Paint, Colour, and Varnish Manufacturers of the United Kingdom.

MR. EDWIN W. BURTT, late manager of de Jersey and Co., Ltd., chemical merchants, 34, Fenchurch Street, London, died on February 3 at 71, Copers Cope Road, Beckenham, Kent, in his 82nd year. The interment took place at Nunhead Cemetery on Wednesday.

PAPERS to be read at a meeting of the Chemical Society on February 15 include "Spinacene: its Oxidation and Decomposition," by A. Chaston Chapman; and "Investigations on the Dependence of Rotatory Power on Chemical Constitution," by R. H. Pickard and H. Hunter.

ON TUESDAY the French Chamber again discussed the convention between the French Government and the Badische Anilin und Sodafabrik. Details of the proposed agreement were published in THE CHEMICAL AGE several months ago. According to statements in the German Press the Badische Co. has offered its "voluntary co-operation" in the manufacture of synthetic ammonia in France.

IN THE KING'S BENCH DIVISION on Tuesday, Mr. Justice Darling entered judgment for Mr. Frederick William Powell, of London, against the West Riding Chemical Co., Ltd., Mirfield, for £410 and costs. The plaintiff alleged that defendants had broken an agreement to employ him as sole agent in the United Kingdom for the sale of their acetic acid production. He said he would have been able to earn £25 weekly.

A JOINT DINNER, to be called the "Ramsay Chemical Dinner," arranged by the Society of Chemical Industry, the Institute of Chemistry, the Society of Dyers and Colourists, the Glasgow University Alchemists' Club, the Andersonian Chemical Society, and the Ardeer Chemical Club, will be held in Glasgow on Friday, February 23. Applications to attend must reach Dr. J. A. Cranston, Royal Technical College, Glasgow, not later than February 16.

THE EXECUTIVE COMMITTEE of the Imperial Commercial Association, which represents largely banking and mercantile interests, have prepared a memorandum on the Safeguarding of Industries Act, which has been circulated to members of the Cabinet and members of the House of Commons. The Memorandum presents what the Committee believe to be new aspects of the Act now in force, calls for its repeal, and offers a new scheme for the protection of legitimate key industries.

PAPERS read at a meeting of the Glasgow Section of the Society of Chemical Industry on February 2 included "Double Salts," by Mr. J. Ferguson; "The Strength of Ammonia as a Base," by Professor R. M. Caven; "Some Comparative Experiments on the Dyeing Properties of Lichens," by Professor T. S. Patterson; and "The Estimation of Inorganic Impurities in Organic Compounds Soluble with Difficulty in Water, as Sulphuric Acid in Picric Acid," by Professor Patterson and Mr. K. L. Moudgill.

SIR W. JOYNSON-HICKS, in a speech at the annual dinner of the Institution of Electrical Engineers on Tuesday, said the commercial man who sneered at research and who was not prepared to lay out the necessary funds for the development of the industry with which he was connected was a hindrance to the progress of commerce. The trade of our country had developed in the past by the working in double harness of the scientist and the commercial man, and it would so develop in the future.

A GENERAL MEETING of the Royal Institution was held on Monday, Sir James Crichton-Browne in the chair. The deaths of Lord Kinnaird and the Hon. R. C. Parsons, members, and of Professor G. Lemoine and G. Lunge, hon. members of the institution, were reported, and resolutions of condolence passed. The thanks of the members were returned to Dr. Ernest Clarke for his donation of £100 to the fund for the Promotion of Experimental Research, and to Sir Humphry Rolleston for his gift of Sir Humphry Davy's honorary diplomas. Mr. and Mrs. Macnab were elected members.

THROUGH THE DEATH of Viscount Exmouth, his only son, Professor Charles Ernest Pellew, who has for some years held the Chair of Chemistry at Columbia University, succeeds to the title. Professor Pellew, who was born in London in 1863, is a Fellow of the New York Academy of Sciences, a member of the American Chemical Society, and is the author of several scientific works, including *A Laboratory Text-Book of General Chemistry*. He was married in 1886 to the daughter of Professor Chandler, of New York. It is stated from Washington that the new Viscount intends to return to England shortly.

PROFESSOR J. B. COHEN, in a lecture on synthetic drugs at Leeds, on Wednesday, spoke of the great difference in the methods used in the scientific study of drugs, and in the manufacture of so-called patent medicines, which were more often than not mixtures of little value, except to the proprietor, who sold them to a credulous public at exorbitant prices. The Government afforded no protection against the exaggerated claims made for these concoctions, and in spite of the report of a Royal Commission, published in 1914, strongly advocating some stringent form of Government control, no legislative measure had yet been introduced.

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Patent Literature

Abstracts of Complete Specifications

191,129. SUPERPHOSPHATES AND MANURE, MANUFACTURE OF. L. Adelantado, 76, Paseo de Gracia, Barcelona, Spain. Application date, October 1, 1921.

In this process the conversion of dry calcic phosphate into superphosphate is obtained without the use of free sulphuric acid, or with a considerably reduced amount. It is found that if the phosphate is mixed with a finely divided neutral sulphate in the presence of water and a nitrogenous organic compound at a temperature of 60° –130° C., the phosphate is converted into a water-soluble compound. In an example, a mixture of three parts of bone phosphate and one part of potassium sulphate is heated to 80°–90° C., yielding a product containing 18–20 per cent. of soluble phosphoric acid, 13–14 per cent. of anhydrous potash, and 2–3 per cent. of organic nitrogen. When natural phosphates containing alkaline materials are treated, a small quantity of sulphuric acid may be added to neutralise the alkali. In the treatment of phosphatic rock, it is preferable that a small quantity of carbonate should be present to generate carbon dioxide and render the mixture porous. If a carbonate is not present, about 2 per cent. of calcium carbonate may be added. Other examples are given of the treatment of Florida mineral phosphate and other mineral phosphates. The final product is a non-caking powder which contains about 12 per cent. of moisture.

191,132. BRINGING LIQUID INTO CONTACT WITH GASES, APPARATUS FOR. H. B. P. Humphries, 14, Old Queen Street, Westminster, London. Application date, October 3, 1921.

The apparatus is for concentrating liquids such as sulphuric acid, or distilling ammonia liquors, or drying gases, and for absorption and scrubbing purposes. In the case of a tower for concentrating sulphuric acid, the walls W enclose elements e, e^1 formed of blocks channelled on the upper and lower sides and superposed one on the other. These blocks project at opposite

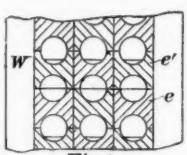
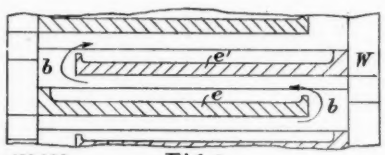


Fig. 1.



191,132 Fig. 2

ends alternately, leaving spaces b between the layers, so that a continuous zigzag passage is formed through the tower. The liquid to be concentrated flows downwards through the tower, and hot gases flow in counter-current. In some cases the columns of blocks may be slightly separated laterally to allow the passage of some of the liquid vertically downwards.

191,208. GRINDING, CRUSHING AND MIXING MILLS. J. Wass, 53, Green Lane, Kettering. Application date, October 25, 1921.

The object is to improve grinding, crushing and mixing mills of the edge runner type to increase the grinding action between the rollers and the pan, and to reduce the tendency to clogging. Each roller is formed as the frustum of a cone, and the bottom of the pan is inclined at a similar angle. The largest diameter of the cone faces towards the centre of the circular pan, so that it travels in a circular path at smaller circumference, while the smaller end of the roller travels in a path of larger circumference. The grinding effect is thereby increased.

191,215. BARIUM OXIDE, PROCESS OF MANUFACTURING. W. von Dieterich of Chemische Fabrik Coswig-Anhalt, G.m.b.H., Coswig in Anhalt, Germany. Application date, October 31, 1921.

In the manufacture of barium oxide from barium carbonate by means of reducing agents such as carbon, it has been found that an increased yield with less consumption of fuel is obtained by effecting the reduction under low pressure and removing the reaction gases continuously by suction. The reaction is effected in a rotary or agitating furnace which may be heated internally by electrical means or by external heating. The reducing agent may be charcoal, soot, pitch or tar, and the temperature may be 1,000°–1,100° C., while the pressure is 65–70 cm. of mercury.

191,233. DIHYDRO-ISOQUINOLINE, MANUFACTURE OF DERIVATIVES OF. O. Y. Imray, London. From Society of Chemical Industry in Basle, Switzerland. Application date, November 16, 1921.

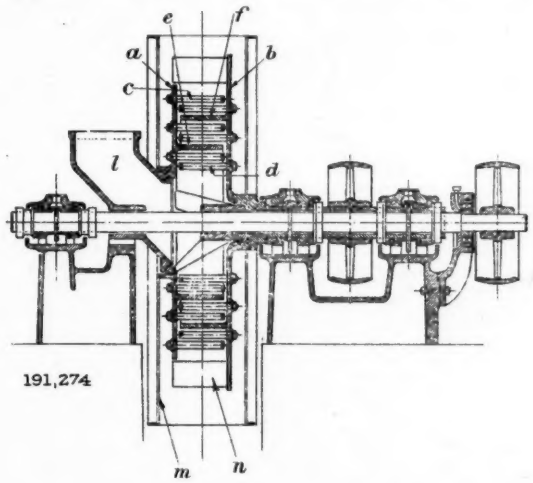
New derivatives of dihydro isoquinoline are manufactured by the hydrogenation of α-acidyl-amino cinnamic acid esters having the formula :—

$$C_6H_5 . CH : C (NH.R^2) . CO_2R^1$$

(where R^1=alkyl, and R^2=acidyl) or nucleal substitution derivatives such as β-3 : 4-dialkyloxy-phenyl-acrylic acid esters. The dihydro-cinnamic acid derivatives thus obtained are converted into derivatives of dihydro-isoquinoline-3-carboxylic acid by treating with a condensing agent such as phosphorus oxychloride, phosphorus pentachloride, or phosphorus pentoxide. The hydrogenation may be effected by the aid of a metallic catalyst such as nickel or platinum. Examples are given of the production of (1) 1-phenyl-6 : 7-dimethoxy-3 : 4-dihydro-isoquinoline-3-carboxylic acid methyl ester methochloride, (2) 1-phenyl-6 : 7-methylene-dioxy-3 : 4-dihydro-isoquinoline-3-carboxylic acid methylester methochloride, (3) 1 : 3^1 : 4^1-methylene-dioxy-phenyl-6 : 7-methylene-dioxy-3 : 4-dihydro-isoquinoline-3-carboxylic acid methyl ester methochloride, (4) 1-β-phenylethyl-6 : 7-methylene-dioxy-3 : 4-dihydro-isoquinoline 3-carboxylic acid methyl ester methochloride. The esters are insoluble in water and have therapeutic properties similar to hydrastinine but without its disadvantages.

191,274. GRINDING OR DISINTEGRATING MACHINES. H. N. Oswald, 32, Victoria Street, Westminster, London, S.W.1. Application date, December 24, 1921.

The machine is of the type in which a pair of coaxial discs are rotated in opposite directions, and each is provided with a series of pins projecting towards the opposite disc. The object is to prevent the passage of material through the machine too rapidly. The pins are arranged in concentric circles, the series being carried by each of the discs a and b alternately, *i.e.*, the pins c are carried by one disc, and the



191,274

pins d by the other disc. Each disc carries annular baffles projecting towards the opposite disc, the baffle e being attached to one disc, and the baffle f to the other. The material to be ground is fed from a hopper l to the centre of the machine, and the outward passage of the unground material is restricted by the partitions. Fan blades n are carried by one of the discs to create an air current which draws the fine material into the casing m.

191,295. TAR AND THE LIKE, DISTILLATION OF. S. W. A. Wikner and The Newcastle-upon-Tyne and Gateshead Gas Co., 33, Grainger Street West, Newcastle-on-Tyne. Application date, January 27, 1922.

In previous processes, tar has been heated but not dehydrated before fractional distillation, or it has been dehydrated by separated heating and then passed direct to the main still. In the present invention these two processes are combined. The tar first passes through a dehydrating apparatus heated by pipe coils, and then to a series of preheaters heated by pipe coils through which pass the vapours from the main stills. The tar then passes through a coil containing pitch from the stills in which it is further heated, and then passes into the main stills.

191,305. AZO-DYESTUFFS, MANUFACTURE OF. O. Y. Imray, London. From Society of Chemical Industry in Basle, Switzerland. Application date, February 16, 1922.

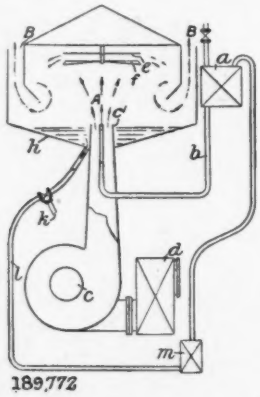
Azo-dyestuffs are obtained by coupling diazotised 1-amino-2-oxynaphthalene-4-sulphonic acid or a halogen or nitro derivative with β-resorcylic acid. In an example the diazo compound made from 1-amino-2-oxynaphthalene-4-sulphonic acid is mixed with a concentrated solution of β-resorcylic acid and sodium carbonate. Caustic soda lye is then added, and when the coupling is complete the soluble dyestuff is precipitated by means of a mineral acid, filtered, pressed and dried. The product yields a red-brown solution in water, becoming violet on adding sodium carbonate, and a violet solution in concentrated sulphuric acid. Violet-blue tints are obtained by chrome printing on cotton. Another example is given of the production of a dyestuff from the nitrated diazo compound of 1-amino-2-oxynaphthalene-4-sulphonic acid and β-resorcylic acid. This dyestuff is soluble in water to a red-brown solution, becoming blue-red on the addition of sodium carbonate, and the sulphuric acid solution is also blue-red. Purple tints are obtained by chrome printing on cotton.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—174,069 (Maschinenfabrik Augsburg-Nurnberg Akt.-Ges.), relating to rotary distilling drums, see Vol. VI, p. 353; 176,354 (A. Kieselwalter), relating to an electric furnace for the production of calcium hydride, see Vol. VI, p. 635; 182,446 (Soc. Chimique des Usines du Rhône), relating to the preparation of basic salicylate of alumina, see Vol. VII, p. 355; 189,114 (Naamlooze Vennootschap Nederlandsche, Kunstzijdefabriek), relating to purifying solutions of viscose see Vol. VIII, p. 103.

International Specifications not yet Accepted

189,772. CONCENTRATING SOLUTIONS OR TREATING LIQUIDS AND GASES. C. Fraisse, Cavaillon, Vaucluse, France. International Convention date, December 5, 1921.

Air or gas is drawn through a heater *d* and delivered by a fan *c* through a pipe c^1 into a chamber A, where it impinges



189,772

on a fan *f*. Liquid passes from a heater *a* through a tube *b* into the air current, and the air and liquid are intimately mixed and distributed in the chamber A. Concentrated liquid collects in the base *h*, and may be returned to the heater *a* for further treatment, while vapour passes out through the passage B. Gases may be dissolved in liquids or eliminated from liquids by this apparatus. It is particularly applicable for treating sugar solutions.

189,453. ABSOLUTE ALCOHOL. P. Loriette, 2, Rue de Mirbel, Paris. International Convention date, November 21, 1921. Addition to 188,336.

Alcohol vapour from a dephlegmator is passed in series through two vessels containing lime, the first vessel being replaced when exhausted by the second, and the second by fresh lime. Condensation is prevented by heating the vapour. The vapour is then passed in a similar manner through vessels containing more effective dehydrating agents such as metalic, calcium or calcium carbide. In the latter case, some acetylene may be absorbed, and the mixture is suitable, when condensed, as a motor-fuel.

189,782. DYES. Society of Chemical Industry in Basle, Basle, Switzerland. International Convention date, November 30, 1921.

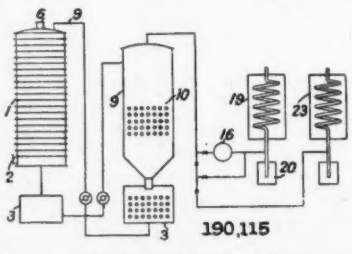
Thioindigoid dyes are obtained by condensing β-thionaphthisatin (Specification 186,859, see THE CHEMICAL AGE, Vol. VII., p. 683) with a cyclic compound having a methylene group such as indoxyl, thioindoxyl, pyrazolone, acenaphthenone, α-oxyanthracene, α-naphthol, or a substitution product or derivative. The products may be halogenised. Examples are given in which (1) β-thionaphthisation is condensed with oxythionaphthene in cold sulphuric acid, diluted with glacial acetic acid and cooled, yielding a product which dyes wool red and cotton bordeaux tints; the product may be brominated, becoming bluer. (2) Violet, grey and brown vat dyestuffs are obtained by replacing the oxythionaphthene by 6-chloro-oxythionaphthene, indoxyl, phenylmethyl-pyrazolone, acenaphthenone, α-naphthol and chlorinated derivatives, dioxynaphthalenes, and α-oxyanthracene. (3) Red- or yellow-brown dyes are obtained from β-thionaphthisatin and 6-aminothioindoxyl-carboxylic acid in alcohol solution with some ammonia. (4) β-thionaphthisatin is condensed with acenaphthenone in chlorobenzene together with zinc chloride.

190,114. AMINO-SULPHONIC ACIDS. G. Poma and G. Pellegrini, Cesano Maderno, Milan, Italy. International Convention date, December 12, 1921.

The process is for obtaining 1 : 8-aminonaphthol-3 : 6-disulphonic acid H. Naphthalene is sulphonated with oleum and then nitrated. The sodium salt of nitro-naphthalene trisulphonic acid is then obtained by pouring into water and salting out. The nitro-body is neutralised with soda and then with calcium carbonate, and then reduced by means of hydrogen in the presence of catalysts such as nickel cobalt, copper or iron, or their oxides, nitrates, silicates or fluosilicates. The aminonaphthol trisulphonic acid solution is then heated to 150°–180° C. with caustic soda, and the H-acid precipitated by mineral acid or the acid liquor from the nitration process.

190,115. PURIFYING GASES AND LIQUIDS. Koppers Co., 800, Union Arcade Building, Pittsburg, U.S.A. (Assignees of F. W. Sperr and R. E. Hall, 600, Union Arcade Building, Pittsburg, U.S.A.) International Convention date, December 8, 1921.

Gas, such as coke oven gas, is freed from sulphuretted hydrogen, carbon dioxide, and hydrocyanic acid, by absorption



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in alkaline solutions which are subsequently heated to recover the absorbed gas. Sodium carbonate solution passes downwards through the bell-washer scrubber 1 and the gas is passed upwards to the outlet 6. The liquor is pumped from the tank 8 to the evaporator 9 heated by steam coils 10. A partial vacuum is maintained by the pump 16, and the sulphuretted hydrogen, etc., is passed to a reflux 19 to condense

water vapour which collects in the tank 20. The purified liquor is returned from the cooler 3 to the scrubber provided that the amount of carbon dioxide absorbed is not large. A proportion of 4 to 5·5 per cent. of sodium bicarbonate in the liquor is desirable, and carbon dioxide may be added, if necessary, for this purpose. If the liquor contains an excess of carbon dioxide, it may be liberated by heating the liquor and conveyed to the condenser 23.

190,116. PURIFYING GASES. Koppers Co., 800, Union Arcade Building, Pittsburg, U.S.A. (Assignees of F. W. Sperr, 600, Union Arcade Building, Pittsburg, U.S.A.) International Convention date, December 8, 1921.

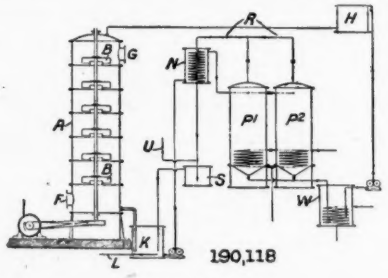
This process of purifying gases from sulphuretted hydrogen, hydrocyanic acid, etc., is similar to that described in 190,115 (see above), but the absorbing solution is used in two stages so that only residual impurities are removed in the second stage. Each solution is separately regenerated by treatment with air.

190,117. PURIFYING GASES. Koppers Co., 800, Union Arcade Building, Pittsburg, U.S.A. (Assignees of E. H. Bird, 600, Union Arcade Building, Pittsburg, U.S.A.). International Convention date, December 8, 1921.

The absorbing and regenerating apparatus used in connection with a gas purifying process as described in 190,115 (see above), comprises a single tower divided into upper and lower chambers. Each chamber contains a filling material resting on a grid, and the purifying solution is sprayed in at the top, while the gas passes through the upper chamber in counter current. The solution then passes to a sprayer at the top of the lower chamber and air is blown upwards through this chamber to remove the absorbed impurities.

190,118. SULPHURETTED HYDROGEN. Koppers Co., 800, Union Arcade Building, Pittsburg, U.S.A. (Assignees of R. E. Hall and F. W. Sperr, 600, Union Arcade Building, Pittsburg, U.S.A.). International Convention date, December 8, 1921.

Gases obtained by cracking petroleum are treated with an aqueous suspension of a compound of magnesium, calcium, barium or strontium or a suspension in alkali of magnesium oxide, hydrate, carbonate or basic carbonate. The process is also applicable to coke oven gases provided the proportion of carbon dioxide is previously reduced. Sulphuretted hydrogen is absorbed and is subsequently recovered in concentrated



190,118

form. The gas is passed into the bottom of a scrubber A and meets the descending liquor from the tank H, which is agitated by rotary bells B. The liquor is then pumped from the tank K through a preheater N to evaporators P^1, P^2. Steam generated in the evaporators is passed through the heating coil in the preheater N, and the condensate is returned through the tank S to the tank K. Sulphuretted hydrogen is drawn off through the pipe W and is used in the manufacture of sulphuric acid. The regenerated liquor passes to a cooling tank W and then back to the tank H for use again.

190,123. SYNTHETIC DRUGS. Soc. Chimique des Usines du Rhône, 21, Rue Jean-Goujon, Paris. International Convention date, December 6, 1921.

Acetyl-salicylic acid is neutralised with calcium hydroxide in the presence of common salt and calcium acetyl-salicylate separates out.

LATEST NOTIFICATIONS.

192,376. Alkylation of carbazol. National Aniline and Chemical Co., Inc. January 25, 1922.

192,392. Manufacture of acetone from acetylene. Elektrizitätswerk Lonza. January 26, 1922.

192,410. Continuous process and apparatus for the production of large quantities of absolute alcohol. Barbet, et Fils, et Cie, E. January 26, 1922.

192,415. Processes for the manufacture of barium hydroxide. Michael and Co., J. January 27, 1922.

Specifications Accepted, with Date of Application

171,390. Hydrocarbons of relatively low boiling point, Process of producing. M. Melamid. November 11, 1920. Addition to 171,367.

174,599. Granules of cyanamide with a high nitrogen content, Process for the production of. Soc. l'Azote Français. January 25, 1921.

174,379 and 174,380. Ores, Concentration of. Hernadvolgyi Magyar Vasipar Reszveny Tarsasag. September 28, 1916, and April 10, 1918.

175,963. Dry distillation, Apparatus for. Maschinenfabrik Augsburg-Nurnberg Akt.-Ges. February 21, 1921.

179,151. Fertilisers, Manufacture of. Zellstofffabrik Waldhof. April 27, 1921.

190,707. Centrifugal apparatus for separating solids from liquids. Soc. Generale d'Evaporation Procédés Prache et Bouillon. December 20, 1921.

191,762. Treating liquids with chemical reagents, Means for. W. Paterson. July 8, 1921.

191,764. Iron, Process for the manufacture of. R. Franchot and K. P. McElroy. July 14, 1921.

191,765. Fixing nitrogen, Process for. K. P. McElroy. July 14, 1921.

191,792. Mordant dyestuffs, Manufacture of. Akt.-Ges. für Anilin-Fabrikation and W. Lange. October 10, 1921. Addition to 16,592/15.

191,797. Substituted alpha-naphthylamines, Manufacture of a series of, and of the dyestuffs derived from them. L. B. Holliday & Co., Ltd., and G. T. Morgan. October 12, 1921.

191,812. Drying or evaporating surfaces or the like. N. Testrup, T. Boberg and Techno-Chemical Laboratories, Ltd. October 15, 1921.

191,854. Dyestuffs of the triarylmethane series, Manufacture of. O. Y. Imray. (*Soc. of Chemical Industry in Basle.*) October 25, 1921.

191,886. Sulphate of lead water paste into oil paste, Process for the conversion of. D. Whyte. November 11, 1921.

191,972. Chromium compounds of azodyestuffs, Manufacture of. Soc. of Chemical Industry in Basle, F. Straub and R. Sallmann. February 8, 1922. Addition to 186,635.

191,977. Disintegrators. G. Porteous. February 27, 1922.

Applications for Patents

Aische, M. I. Manufacture of soaps. 2591. January 29.

Alvord, E. B., and Howard, H. Process of making metal sulphides. 2665. January 29.

Baskerville, C. H. V. Producer for gasifying bituminous, etc., fuels. 2755. January 30.

Bolton, F. Treatment of colloidal matter by alkali and acid. 2629. January 29.

Brandwood, J. Apparatus for bleaching, dyeing, etc., textile fibres. 2595. January 29.

Coley, H. E. Manufacture of thorium, cerium, etc. 2894. January 31.

Edwards, H. Separation of ores containing sulphides of zinc, lead and iron. 3199. February 2.

Heyl, G. E. Distillation of oil shale, coal, etc. January 31. 2882.

Heyl, G. E. Production of sulphur containing oil from oil shale. 3007. February 1.

Kroll, C. Cracking petroleum products. 2642. January 29.

Kur, E. F., and Wilkinson, F. Manufacture of siliceous ultramarine colours. 3110. February 2.

Low Engineering Co., Ltd., and Low, K. S. Production of hydrated carbonate of magnesia. 3299. February 3.

Michael and Co., J. Manufacture of barium-hydroxide. 2597. January 29. (Germany, January 27, 1922.)

Mitchell, I., and Wordsworth, G. H. Dyeing, etc., machine. 2833. January 31.

Naef, E. E. Production of compounds of sulphur with alkaline earth metals. 2944. January 31.

Nangatuck Chemical Co. Process for vulcanisation of rubber, etc. 2778. January 30. (United States, July 13, 1922.)

Soc. d'Etudes Chimiques pour l'Industrie. Manufacture of urea from cyanamide. 3001. February 1. (Switzerland, February 4, 1922.)

Starkey, T. R. Distillation of oil shales, coal, etc. 3190. February 2.

Thermal Industrial and Chemical (T.I.C.) Research Co., Ltd. Removal of matter from surface of a liquid in heat-treatment by molten metal, etc. 3198. February 2.

Worsley, A. Production and use of hyposulphurous acid. 3292. February 3.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

London, February 8, 1923.

BUSINESS still continues very active, and the inquiry for forward positions is well maintained. Prices are very firm, with an upward tendency in many cases.

The immediate outcome of the Continental situation is still uncertain, but it is apparent that if it has any effect upon prices at all, it will be in the upward direction, and already we hear of two or three cases of German works suspending deliveries owing to the want of coal.

Export demand is fairly satisfactory, although, naturally, export trade to the Continent is disturbed.

General Chemicals

ACETONE remains very scarce, and any supplies appearing on the market are eagerly snapped up.

ACID ACETIC is, perhaps, not quite so firm, but the demand is very active.

ACID CITRIC.—More interest is being taken in this product, and higher figures are indicated.

ACID FORMIC has been moderately active with price unchanged.

ACID LACTIC.—Very firm and in good demand.

ACID OXALIC is without change in value and moves steadily into consumption.

ARSENIC.—The export demand is as brisk as ever, and good business has been done well on into the year at high figures.

BARIUM CHLORIDE has again declined slightly and now looks to be extremely cheap.

FORMALDEHYDE is moderately active and prices well maintained.

LEAD ACETATE is scarce and firm.

METHYL ALCOHOL is as scarce as ever, and high prices are paid for any small parcels obtainable.

POTASSIUM CARBONATE is unchanged.

POTASSIUM CAUSTIC is weak and in very small request.

POTASSIUM PERMANGANATE maintains its advance and is in active demand.

POTASSIUM PRUSSIATE continues scarce and firm.

SODIUM ACETATE is firm, but only in moderate demand.

SODIUM HYPOSULPHITE has been well called for at makers' figures.

SODIUM NITRITE is in good request and price is steadier.

SODIUM PRUSSIATE is only moderately active, but there are more signs of export inquiry being again in evidence.

ZINC OXIDE is unchanged.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID continues firm.

ACETANILID is in active demand at current prices.

BROMIDES.—Prices are unchanged, and considerable business has been transacted.

COCAIN is firm and in good demand.

EUCALYPTUS OIL is a weak market, nominally unchanged.

HEXAMINE is very firm with steady business passing. Higher prices are expected to rule.

GUAIACOL CARBONATE has been in demand for export. Higher prices are foreshadowed.

PHENACETIN is firm and in good demand.

SODA SALICYLATE has been very active. Higher prices are expected in sympathy with the carbolic acid market.

VANILLIN.—Unchanged. Last prices are well maintained.

Coal Tar Intermediates

Business continues on quiet lines without any special features to report.

ALPHA NAPHTHOL.—Some small inquiry has been received.

ALPHA NAPHTHYLAMINE is steady with but small trade moving.

ANILINE OIL has been a fair business.

BENZIDINE BASE is without special feature.

BETA NAPHTHOL is slightly easier and some fair inquiries have been received.

BETA NAPHTHYLAMINE has been in request and resale parcels seem to be absorbed.

DIMETHYLANILINE is a small trade.

"H" ACID has been requested for home account.

NEVILLE AND WINTHER ACID has been in demand on home account.

NITRO BENZOL.—The usual small orders have been booked.

PARANITRANILINE is a shade easier.

RESORCINE, TECHNICAL, is firm, but supplies are still available for immediate delivery.

Coal Tar Products

The market generally is decidedly firm, and there is some improvement in the demand.

90's BENZOLE is without change in price, though some sellers now ask 1s. 7½d. to 1s. 8d. per gallon on rails in the Midlands.

PURE BENZOLE is quiet at 2s. per gallon in the North, and 2s. 6d. per gallon in London.

CREOSOTE OIL is still scarce, and the demand is good. The value in the Midlands and North is about 8d. per gallon on rails, and 8½d. in the South.

CRESYLIC ACID continues to be slow of sale, and without change in price.

SOLVENT NAPHTHA is quiet, and is worth about 1s. 6d. to 1s. 7d. per gallon on rails in the North, and 1s. 10d. to 2s. per gallon in London.

HEAVY NAPHTHA is neglected.

NAPHTHALENE.—There is still a good demand for prompt and near forward delivery at from £6 to £10 per ton, according to quality.

PITCH.—The market is still very firm, and business appears to be only limited by the offerings of sellers. To-day's prices are 154s. to 155s. f.o.b. East Coast, 155s. to 160s. f.o.b. London, and 145s. to 150s. f.o.b. West Coast.

Current Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	4	to	0	1	6
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	130	0	0	to	135	0	0
Acid, Acetic, glacial, 99–100%	ton	67	0	0	to	68	0	0
Acetic, 80% pure	ton	45	0	0	to	46	0	0
Arsenic, liquid, 2000 s.g.	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	55	0	0	to	60	0	0
Carbolic, cryst. 39–40%	lb.	0	0	8¾	to	0	0	9
Citric	lb.	0	1	9	to	0	1	10
Formic, 80%	ton	50	0	0	to	51	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	41	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	44	0	0
Nitric, 80 Tw.	ton	27	0	0	to	29	0	0
Oxalic	lb.	0	0	7	to	0	0	7½
Phosphoric, 1.5	ton	40	0	0	to	42	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, Technical	lb.	0	1	2	to	0	1	4
Sulphuric, 92–93%	ton	6	10	0	to	7	10	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	2½	to	0	1	3
Alum, lump	ton	11	10	0	to	11	15	0
Alum, chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	9	0	0	to	9	5	0
Aluminium, sulphate, 14–15%	ton	7	10	0	to	8	0	0
Aluminium, sulphate, 17–18%	ton	9	10	0	to	10	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8

	Per	£	s.	d.		£	s.	d.
Ammonia, .880	ton	32	0	0	to	34	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to	0	0	4½
Ammonia, chloride	ton	50	0	0	to	55	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate (pure)	ton	35	0	0	to	40	0	0
Ammonia, phosphate	ton	65	0	0	to	68	0	0
Ammonia, sulphocyanide, com'l, 90%	lb.	0	1	1	to	0	1	3
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white, powdered	ton	70	0	0	to	75	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Barium carbonate, Precip.	ton	15	0	0	to	16	0	0
Barium, Chlorate	ton	65	0	0	to	70	0	0
Barium Chloride	ton	15	0	0	to	15	15	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	1	0	to	0	1	1
Bleaching powder, 35–37%	ton	10	10	0	to	11	0	0
Borax crystals	ton	28	0	0	to	32	0	0
Calcium acetate, Brown	ton	12	10	0	to	13	10	0
,, ,, Grey	ton	17	10	0	to	18	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	6	0	0	to	7	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	98	0	0	to	105	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	2	to	0	1	3
Sulphate	ton	27	10	0	to	28	10	0
Cream Tartar, 98–100%	ton	92	10	0	to	95	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	90	0	0	to	95	0	0
Formusol (Rongalite)	lb.	0	2	2	to	0	2	3
Glauber salts, commercial	ton	5	0	0	to	5	10	0
Glycerin, crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	3	to	0	2	4
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	41	0	0	to	43	0	0
Carbonate (White Lead)	ton	45	0	0	to	48	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	22	10	0	to	23	10	0
Magnesium chloride	ton	5	10	0	to	6	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	6	10	0	to	7	0	0
Sulphate (Druggists')	ton	10	0	0	to	11	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	58	0	0	to	60	0	0
Methyl acetone	ton	70	0	0	to	75	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	45	0	0	to	46	0	0
Ammonium sulphate, double salt	ton	45	0	0	to	46	0	0
Potash, Caustic	ton	32	0	0	to	33	0	0
Potassium bichromate	lb.	0	0	6	to	0	0	6½
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	10	0	to	10	10	0
Chlorate	lb.	0	0	4½	to	0	0	4½
Metabisulphite, 50–52%	ton	84	0	0	to	90	0	0
Nitrate, refined	ton	43	0	0	to	45	0	0
Permanganate	lb.	0	0	9	to	0	0	9½
Prussiate, red	lb.	0	4	3	to	0	4	6
Prussiate, yellow	lb	0	1	6½	to	0	1	7½
Sulphate, 90%	ton	12	10	0	to	13	10	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	24	10	0	to	24	15	0
Arseniate, 45%	ton	40	0	0	to	42	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4½
Bisulphite 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3½	to	0	0	3½
Caustic, 70%	ton	19	10	0	to	20	0	0
Caustic, 76%	ton	20	10	0	to	21	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	28	0	0	to	29	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	10	to	0	0	10½
Prussiate	lb.	0	0	10½	to	0	0	11
Sulphide, crystals	ton	10	10	0	to	11	0	0
Sulphide, solid, 60–62%	ton	16	10	0	to	17	10	0
Sulphite, cryst.	ton	12	10	0	to	13	0	0
Strontium carbonate	ton	55	0	0	to	60	0	0
Strontium Nitrate	ton	40	0	0	to	42	0	0
Strontium Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	11	10	0	to	12	10	0
Roll	ton	11	0	0	to	12	0	0
Tartar emetic	lb.	0	1	3	to	0	1	4
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	40	0	0	to	42	0	0
Dust, 90%	ton	45	0	0	to	47	10	0
Sulphate	ton	16	10	0	to	17	10	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	2	10	to	0	3	0
Acetanilid	lb.	0	1	4	to	0	1	6
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	9	to	0	3	0
Salicylic, B.P.	lb.	0	1	5	to	0	1	7
Tannic, leviss	lb.	0	3	4	to	0	3	6
Amidol	lb.	0	8	6	to	0	8	9
Amidopyrin	lb.	0	14	0	to	0	14	6
Ammon ichthosulphonate	lb.	0	2	0	to	0	2	3
Barbitone	lb.	0	12	6	to	0	13	6
Beta naphthol resublimed	lb.	0	1	9	to	0	2	0
Bromide of ammonia	lb.	0	0	7½	to	0	0	8
Potash	lb.	0	0	6½	to	0	0	7
Soda	lb.	0	0	7	to	0	0	7½
Caffeine, pure	lb.	0	12	0	to	0	12	3
Calcium glycerophosphate	lb.	0	5	6	to	0	6	0
Calcium lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	4	9	to	0	5	0
Chloral hydrate	lb.	0	4	3	to	0	4	6
Cocaine alkaloid	oz.	0	18	6	to	0	19	0
Cocain hydrochloride	oz.	0	15	0	to	0	15	6
Corrosive sublimate	lb.	0	4	3	to	0	4	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	1	7	to	0	1	7½
B.P. (75–80% eucalyptol)	lb.	0	1	8	to	0	1	8½
Guaiacol carbonate	lb.	0	8	0	to	0	8	3
Liquid	lb.	0	9	0	to	0	9	6
Pure crystals	lb.	0	10	0	to	0	10	6
Hexamine	lb.	0	3	9	to	0	4	0
Hydroquinone	lb.	0	3	0	to	0	3	3
Lanoline anhydrous	lb.	0	0	7½	to	0	0	8
Lecithin ex ovo	lb.	0	18	6	to	1	0	0
Lithia carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	2	to	0	2	6
Metol	b.	0	10	0	to	0	10	6
Milk sugar	cwt.	4	17	6	to	5	2	6
Paraldehyde	lb.	0	1	5	to	0	1	6
Phenacetin	lb.	0	5	0	to	0	5	3
Phenazone	lb.	0	6	6	to	0	6	9
Phenolphthalein	lb.	0	5	0	to	0	5	3
Potassium sulpho guaiacolate	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.	oz.	0	2	3			—	
Resorcine, medicinal	lb.	0	5	3	to	0	5	6
Salicylate of soda powder	lb.	0	2	0	to	0	2	3
Crystals	lb.	0	2	1	to	0	2	4
Salol	lb.	0	2	3	to	0	2	6
Soda Benzoate	lb.	0	2	0	to	0	2	3
Sulphonal	lb.	0	13	6	to	0	14	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	6
,, soda salicylate	lb.	0	8	0	to	0	8	6
Vanillin	lb.	1	2	0	to	1	3	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Alphanaphthol, refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9½	to	0	0	10
Aniline salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	0	to	0	3	3
Benzidine, base	lb.	0	5	0	to	0	5	3
Benzidine, sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	6	to	0	2	3
Betanaphthol	lb.	0	1	2½	to	0	1	3
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0

	Per	£	s.	d.		£	s.	d.
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	7	to	0	1	9
Dimethylaniline	lb.	0	2	6	to	0	2	9
Diphenylamine	lb.	0	3	9	to	0	4	0
H-Acid	lb.	0	5	0	to	0	5	3
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	2	3	to	0	2	6
Naphthionate of Soda	lb.	0	2	6	to	0	2	9
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	9	to	0	8	0
Nitrobenzol	lb.	0	0	8	to	0	0	8½
Nitronaphthalene	lb.	0	1	0	to	0	1	1
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol, base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Para-amidophenol, hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	0	to	0	3	3
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	11	6	to	0	11	9
Paratoluidine	lb.	0	5	9	to	0	6	3
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.	£	s.	d.
Anise ..... c.i.f. 1/10½ spot	0	2	1
Bay	0	0	11
Bergamot	0	11	6
Cajuput	0	3	9
Camphor, white ..... per cwt.	4	2	6
Camphor, brown ..... per cwt.	3	18	0
Cassia ..... c.i.f. 7/- spot	0	8	0
Cedarwood	0	1	6
Citronella (Ceylon) ..... very firm	0	3	0
Citronella (Java) ..... vern firm	0	3	5
Clove ..... easier	0	7	0
Eucalyptus ..... dull	0	1	6
Geranium Bourbon	1	4	0
Lavender ..... easier	0	12	0
Lavender spike ..... easier	0	3	3
Lemon	0	2	10½
Lemongrass ..... per oz.	0	0	2½
Lime (distilled) ..... firm	0	3	0
Orange sweet (Sicilian)	0	9	0
Orange sweet (West Indian)	0	8	6
Palmarosa ..... firm	0	17	6
Peppermint (American)	0	13	6
Mint (dementholised Japanese)	0	7	3
Patchouli	1	12	0
Otto of Rose ..... per oz	1	4	0
Rosemary ..... easier	0	1	8
Sandalwood	1	6	0
Sassafras	0	5	0
Thyme ..... as to quality 2/4 to	0	6	6
Synthetics.			
Benzyl acetate	0	2	9
Benzyl benzoate	0	2	9
Citral	0	10	6
Coumarine	0	12	0
Heliotropine	0	5	6
Ionone	1	7	0
Linalyl acetate	1	2	6
Methyl salicylate	0	2	0
Musk xylol	0	8	6
Terpeniol	0	2	10½

The Manchester Chemical Market

[From our own Correspondent.]

Manchester, February 8, 1923.

The position of the chemical market here is much the same as at the last report. On the whole, business is quieter than it was in the earlier weeks of the year, although home buyers are taking fair quantities of the leading lines of "heavies." Except for one or two products the foreign demand is rather subdued. Sulphate of copper is said to be maintaining the improvement on the export side reported during the last week or two, while arsenic is another product that is being steadily called for for shipment. Political events during the early days had a somewhat unsettling effect, but confidence was restored with the more promising news on Tuesday.

Heavy Chemicals

Both home and overseas buyers of caustic soda are taking steady quantities and prices are very firm at from £19 per ton for 60–68 per cent. strength to £21 10s. for 76–77 per cent. Bleaching powder is rather quieter at £11 10s. per ton. Soda crystals are steady and in fair demand at £5 10s. per ton, delivered. Saltcake is still inactive for the home trade, though there is a moderate demand for export; the price is firm at £4 10s. per ton. Sodium sulphide, 60–65 per cent. concentrated, is on offer at £16 per ton and crystals at £10, but little business is being put through. Glauber salts are quiet but unchanged at £4 10s. per ton. Bicarbonate of soda is in moderate demand at £10 10s. per ton. Alkali maintains its activity both on home and foreign account, 58 per cent. being quoted at £7 12s. 6d. per ton. Hyposulphite of soda is steady at £16 per ton for photographic crystals and about £10 for commercial, but little improvement in the demand can be reported. Supplies of nitrate of soda are still on the short side, and, with the demand maintained, prices are well held at £27 to £28 per ton. Phosphate of soda is firm at £16 per ton, but business is quiet. Chlorate of soda is in fairly active inquiry at 2¾d. to 3d. per lb. Prussiate of soda is quiet but steady at 9¾d. per lb. Bichromate of soda is being bought in satisfactory quantities at 4½d. per lb. Acetate of soda keeps very firm at about £23 10s. per ton, sellers meeting with a moderately steady demand.

Caustic potash is rather a quiet section at £28 10s. per ton for 88–90 per cent. strength. Carbonate of potash is quoted at £31 per ton for 96–98 per cent. material and £24 for 90 per cent., the demand being steady. The improvement in bichromate of potash is maintained, and the price is very firm at 6d. per lb. Yellow prussiate of potash keeps quiet, and the price is now about 1s. 5½d. per lb., with red still offered at 4s. Chlorate of potash is steady at 3d. per lb., a fair amount of business being transacted. Permanganate of potash is in better demand at 8d. per lb.

Among miscellaneous chemicals quite a good demand for sulphate of copper for shipment is still reported, though there has been little extension of home consumption; price is very firm at £26 10s. per ton. Arsenic is quoted at £75 per ton for spot parcels of white powdered Cornish makes when obtainable, American buyers being prominent in the market. Commercial Epsom salts are in moderate inquiry at £5 10s. per ton; magnesium sulphate, B.P., is steady at £8. Grey acetate of lime has advanced again on scarcity, £19 per ton now being asked; brown is offered at £10. The demand for nitrate of lead is rather dull, though the price keeps steady at £42 per ton. White sugar of lead is firm and in fairly active inquiry at £40 per ton, with brown quoted at £36 to £37. Alum keeps quiet at £12 per ton for loose lump.

Acids and Tar Products

Tartaric acid is in good demand and slightly firmer at 1s. 2½d. to 1s. 3d. per lb. Citric acid, B.P. crystals, is steady at 1s. 8½d. Acetic acid is quoted at £67 for glacial and £43 per ton for 80 per cent. technical, consumers taking good supplies. Oxalic acid is a sluggish section at 6¾d. per lb.

The foreign demand for pitch continues unabated, and £7 and over per ton, f.o.b. Manchester, is being asked for prompt parcels. Carbolic acids are firmer and in steady inquiry at round 9d. per lb. for crystals and 2s. 9d. per gallon for crude, 60 per cent. material. Benzole is quiet at 1s. 8d. to 1s. 9d. per gallon. Solvent naphtha is unchanged at 1s. 8d. per gallon, the market for this product being very dull.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, February 7, 1923.

DURING the past week a moderate number of inquiries were received, but business was quiet, the number of orders booked being comparatively small.

Numerous Continental price lists continue to be received, and in most cases prices named are slightly lower than a week ago.

Industrial Chemicals

ACID ACETIC.—Glacial 98/100%, £58 to £62 per ton; 80% Tech., £43 to £44 per ton; pure, £43 to £46 per ton. All c.i.f. U.K. ports.

ACID BORACIC.—Price unchanged. Crystal or granulated, £55 per ton; powdered, £57 per ton, carriage paid U.K. stations.

ACID CITRIC.—Quoted 1s. 7d. per lb., spot delivery.

ACID, FORMIC 80%.—On offer at £55 per ton, ex wharf.

ACID HYDROCHLORIC.—Price remains unchanged at 6s. 6d. per carboy, ex works.

ACID NITRIC 84°.—Offered at £27 10s. per ton, ex station, full loads.

ACID OXALIC.—Price about 6½d. per lb., ex wharf, early delivery.

ACID SULPHURIC.—144°, £4 per ton; 168°, £7 5s. per ton, ex works; de-arsenicated quality, £1 per ton extra.

ACID TARTARIC.—Inclined to be higher at 1s. 2½d. per lb., ex store.

ALUM & LUMP POTASH.—Continental material offered at £12 5s. per ton, ex store.

ALUMINA SULPHATE, 17/18%.—English material about £11 10s. per ton; Continental, £10 per ton, ex wharf.

AMMONIA & ANHYDROUS.—Unchanged at 1s. 6d. per lb., ex station.

AMMONIA, CARBONATE.—Lump, 4d. per lb.; ground, 4½d. per lb., delivered.

AMMONIA LIQUID.—880°, 2¾d. per lb; 920°, 1¾d. per lb., ex works.

AMMONIA MURIATE.—Grey galvanisers, £31 to £32 per ton, f.o.r. works.

AMMONIA SULPHATE.—25¼%, £15 5s. per ton; 25¾% neutral, £16 8s. per ton, ex works, February.

ARSENIC, WHITE POWDERED.—Still scarce, with a good demand for export. Price about £75 per ton, ex wharf.

BARIUM CHLORIDE.—Offered at £16 per ton, c.i.f. U.K. port, early delivery.

BARYTES.—Finest English white, £5 5s. per ton, ex works.

BLEACHING POWDER.—Spot lots, £11 10s. per ton, ex station. Contracts £1 per ton less.

BORAX.—Crystal or granulated, £28 per ton; powdered, £29 per ton, carriage paid, U.K. stations.

CALCIUM CHLORIDE.—English material, £5 15s. per ton, ex quay or station. Continental, about £4 15s. per ton, ex store.

COPPER SULPHATE.—Price about £26 per ton, f.o.b.

COPPERAS, GREEN.—Quoted £3 15s. per ton, ex store.

FORMALDEHYDE, 40%.—Moderate inquiry. Quoted £89 per ton, c.i.f. U.K., early shipment.

GLAUBER SALTS.—Price about £4 per ton, ex store. Offered from Continent at £2 17s. 6d. per ton, c.i.f. U.K.

LEAD.—English make of red advanced 15s. per ton; now £41 per ton, carriage paid U.K.; continental make offered at £34 per ton, c.i.f. U.K.; white now £53 5s. per ton, carriage paid, 5-ton lots.

LEAD NITRATE.—Offered at £40 per ton, ex store, spot delivery.

MAGNESITE.—Quoted £6 to £9 per ton, ex station, according to quality.

MAGNESIUM CHLORIDE.—Offered from Continent at £2 17s. 6d. per ton, c.i.f. U.K. Spot lots £3 15s. per ton, ex store.

MAGNESIUM SULPHATE (EPSOM SALTS).—English B.P. quality £7 per ton, f.o.b. U.K. Continental commercial offered at £5 per ton, ex store.

POTASSIUM BICHROMATE.—English makers quote 6d. per lb., delivered.

POTASSIUM CARBONATE 90/92%.—About £27 per ton, ex store, spot delivery.

POTASSIUM CAUSTIC, 88/92%.—Now quoted £30 per ton, ex store.

POTASSIUM CHLORATE, 98/100%.—Quoted 3d. per lb., ex store.

POTASSIUM MURIATE.—90/95% quoted £8 10s. per ton, f.o.b. U.K.

POTASSIUM NITRATE (SALTPETRE).—Offered at £23 per ton, c.i.f. U.K., early shipment.

POTASSIUM PERMANGANATE.—B.P. crystals about 8¾d. per lb., ex store.

POTASSIUM PRUSSIATE (YELLOW).—Now quoted 1s. 5½d. per lb. delivered.

POTASSIUM SULPHATE, 90/95%.—Quoted £13 per ton, basis 90%, c.i.f. U.K.

SODIUM ACETATE.—Price about £24 per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; m.w. quality, £1 10s. per ton less.

SODIUM BICHROMATE.—English makers' price, 4½d. per lb. delivered U.K.

SODIUM CARBONATE.—Soda crystals, £5 5s. per ton, ex quay or station; alkali 58%, £8 17s. 6d. per ton, ex quay or station.

SODIUM CAUSTIC.—76/77%, £21 10s. per ton; 70/72% £20 per ton; 60/62% broken, £21 5s. per ton; 98/99% powdered, £24 17s. 6d. per ton, ex station.

SODIUM HYPOSULPHITE.—Commercial quality, £10 10s. per ton, ex station; pea crystals, £16 per ton, ex store.

SODIUM NITRATE.—96/98% refined quality, £13 2s. 6d. per ton, f.o.b. U.K.

SODIUM PRUSSIATE (YELLOW).—Now offered at 10¼d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE, 95%).—Price to home consumers, £4 per ton, delivered. Higher prices for export,

SODIUM SULPHIDE.—Spot lots, 60/62%, offered at £15 per ton, ex store. Quoted £12 10s. per ton, c.i.f. U.K.; 30/32% crystals, £7 5s. per ton, c.i.f. U.K.

SULPHUR.—Government surplus stocks of sicilian thirds still available at £3 10s. to £3 15s. per ton, ex depot; flowers, £10 per ton; roll, £9; rock, £8; ground, £8; prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 2d. per lb.

ZINC, SULPHATE—.Technically pure crystals, £14 10s. per ton, ex station.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Good export inquiries. Price 1s. 6½d. per lb. f.o.b.

BETA NAPHTHOL.—Good home and export inquiries. The market is inclined to harden and the price quoted is 1s. 1d. per lb., carriage paid.

CARBON BISULPHIDE.—Small inquiry. Price quoted £30 per ton f.o.r. works.

NAPHTHALENE, FLAKE.—Small export inquiries. Price quoted £16 per ton f.o.b.

NEVILLE AND WINTHER ACID.—Several small inquiries. Price 6s. per lb. on 100% basis, carriage paid.

PARANITRANILINE.—Small home inquiry. Price 2s. 8d. per lb. delivered.

PARANITROTOLUOL.—Offered at 2s. 5d. per lb. delivered.

PARAPHENYLENEDIAMINE.—Export inquiry. Price remains firm at 12s. per lb.

PURE METHYL ALCOHOL.—Supplies are very scarce and prices are higher at about £95 per ton c.i.f. English port.

Westminster Bank Ltd.

The Chairman's Statement on Trade Prospects

THE annual ordinary general meeting of the shareholders of the Westminster Bank, Ltd., formerly the London County Westminster and Parr's Bank, was held at 41, Lothbury, London, E.C., on February 1, Mr. Walter Leaf (the Chairman) presiding.

The Chairman said the past year had been for this country one of stabilisation. Fiscally we had been engaged in stabilising the £. This had been effected by just balancing the Budget and leaving nothing over for the payment of debt. We have thus avoided adding to the suffering involved in deflation and had escaped the far greater evils which accompanied inflation, ills of which Germany was at present giving us a terrible example. The result of this policy was that prices during 1922 had been remarkably steady, and the purchasing power of the £ had been stabilised.

Having detailed factors which went to show that we were on the way to recover through reduced prices the position we held in international trade before the war, the Chairman went on to speak of the dark cloud of unemployment, which he showed was essentially a world phenomenon.

Burden of Taxation

Of course we felt the burden of taxation which honesty involved, and so far as the urgent cry for relief took the form of an insistence on reduced expenditure—the one means by which taxation could be legitimately reduced—it must have all our sympathy. But when one saw suggestions that we should not attempt to pay our way, that we should accept a deficit in the Budget and borrow the money in order to relieve the burden of the moment by throwing it vaguely somewhere on the future, then it was time to raise the voice of protest.

The Continental Outlook

The immediate problem of unemployment, continued Mr. Leaf, depended on the prospect of such an early improvement in trade and industry as would afford the natural, and therefore most efficient, remedy for the present troubles. The Continental outlook at least was not encouraging. The recent action of France on the Ruhr could only be viewed with the gravest anxiety, the more so as it served to complete the economic collapse which Germany had already been to all appearances rapidly approaching. It was clearly impossible to hope for any great revival of trade from any of our old customers in Central Europe, whose recovery was entirely bound up with that of Germany. We must draw what little consolation we could from the fact that so important an industrial rival as Germany had practically withdrawn from competition, except for certain classes of goods where she practically held the monopoly—notably dye-stuffs. That, no doubt, counted for something; but it was only a short-sighted view which could see in this an equivalent for the general prosperity which was interrupted by the war. Having commented on the position further East—in Russia, China, and India—the Chairman went on to say that, in spite of the adverse conditions, there were definite signs of a strong trade revival which was already doing something to diminish unemployment here, and seemed likely before long to do a great deal more.

Finally the Chairman, referring to the internal affairs of the Bank, said their total profits showed a shrinkage, but this was an experience the bank shared with its competitors; but on the whole the shareholders would, he hoped, feel that the results were not unsatisfactory. The year had, for pure banking profits, been rather a lean one, but on the other hand, the appreciation in the value of investments had made up for a good deal that they had missed in other ways.

At a special meeting which followed, a resolution embodying acceptance of the change of name to Westminster Bank, Ltd., was agreed to.

Methods of Estimating Arsenic

THE official report of the joint Conference of the Society of Public Analysts and the Nottingham Section of the Society of Chemical Industry held on January 17 has now been issued. In the course of the discussion Major S. R. Trotman advocated the calling of a conference to discuss the standardisation of methods of estimating arsenic.

Demand for Nitrate

Quieter Tendency Noticeable on the Continent

IN their nitrate market report dated January 20, Aikman (London), Ltd., state that since January 5 the arrivals amount to about 36,000 tons, and about 60,000 tons are due during the next fortnight.

The tone continued very strong during the early part of the fortnight with an active demand from consumers all over Europe, but the recent upheaval on the Continent and the consequent fluctuations in exchanges have resulted in a quieter tendency, more especially in the French and Belgian markets. The undertone, however, remains good, and any settlement of the present Continental troubles would undoubtedly result in a strong demand from consuming centres.

Several further steamer parcels were bought by Hamburg importers at £12 12s. 6d. for January arrival and at about £12 10s. to £12 11s. per ton c.i.f. for April arrival, and it is understood that some sales to German agriculturists have already been arranged. A December steamer cargo was also reported sold to Poland at £13 1s. 6d. per ton c.i.f. Apart from the above, business in cargoes has been restricted, and closing values are about £12 12s. 6d. to £12 15s. per ton for due and near, and £12 12s. 6d. to £12 10s. per ton for February shipment.

Considering the great activity during the preceding fortnight, sales by the Producers' Association have been satisfactory, and have amounted to about 37,000 tons for January-March and 12,000 tons for June shipment, making the total sales for shipment from July 1, 1922, to April 30, 1923, 1,381,000 tons and 160,000 tons for shipment in June, 1923.

Continued American Buying

The American market continues firm with a good demand, and considerable competition was reported for the 10,000 tons offered and sold by the American Government on January 15. A further 28,000 tons is up for tender at the end of this month, after the sale of which the reserve war stock will be reduced to about 85,000 tons, and it is reported that no further lots will then be offered for sale. Of the total sales made by the Producers' Association during the fortnight about 20,000 tons were bought by American importers.

The production figures for December were cabled: 128,000 tons, against 74,000 in 1921, 220,000 in 1920, and 230,000 in 1913. Stocks in Chile, December 31, were 1,216,000 tons, against 1,449,000 in 1921, 1,304,000 in 1920 and 498,000 in 1913. The shipment figures for the first half of January (in tons) were cabled as follow: To Europe and Egypt, 60,000, against 14,000 in 1922, 51,000 in 1921, and 71,000 in 1914; to United States, 58,000, against 7,000 in 1922, 22,000 in 1921, and 7,000 in 1913; to Japan and other countries, 2,000, against 12,000 in 1922, 2,000 in 1921, and 10,000 in 1913.

Disputed Quality of Soap

IN the Mayor's and City of London Court, on February 1, before Judge Shewell Cooper, Herbert N. Holder, trading as Holder and Sons, 46, Cannon Street, London, sued Messrs. John Baird and Co., merchants, 16, Water Lane, for £6 2s. 6d., for 5 cwt. of pale yellow bar soap in 1 lb. naked bars at 24s. 6d. per cwt., carriage paid, Cardiff. The defendants, who paid £4 7s. 6d., into Court, contended that the soap sent was not according to sample, whereas the plaintiff maintained that it was. Judge Sherwell Cooper found that the soap was not according to sample, and directed that the plaintiff should have the £4 7s. 6d. paid into Court, the defendants to have the costs after the payment.

A Hydrogen Peroxide Plant Explosion

THE British Drug Houses, Ltd., report that the hydrogen peroxide plant at their Wharf Road works was severely damaged by an explosion on February 1 owing to the neglect on the part of one of the process hands to carry out one of the standing regulations made for the safe working of this plant. Fortunately no one was injured, as the chemist in charge detected a warning sign, with the result that the occupants of the building were able to get away in time. The company carry a good stock of their pure hydrogen peroxide, and hope that the arrangements made for the immediate reconstruction of the plant will result in fresh production before the present stock is exhausted.

LONDON COUNTY WESTMINSTER & PARR'S BANK LTD.

ESTABLISHED IN 1836.

Head Office ... 41, LOTHBURY, E.C.2

AUTHORISED CAPITAL ... £33,000,000 PAID-UP CAPITAL ... £9,003,718 RESERVE ... £9,003,718

WALTER LEAF, *Chairman.*

SIR MONTAGU CORNISH TURNER and ROBERT HUGH TENNANT, *Deputy-Chairmen.*

JOHN RAE, *Chief General Manager.*

BALANCE SHEET, 31st DECEMBER, 1922.

LIABILITIES.

		£	s.	d.
Capital—				
Authorized	£33,000,000			
1,414,198 Shares of £20 each, £5 paid	£7,070,990 0 0			
1,932,728 Shares of £1 each, fully paid	1,932,728 0 0			
		9,003,718	0	0
Reserve		9,003,718	0	0
Current Deposit and other Accounts, including provision for Contingencies ...		280,820,291	16	3
Notes in Circulation in the Isle of Man ..		14,316	0	0
Acceptances, Endorsements, etc.		9,923,238	7	9
Rebate on Bills not due		262,325	10	9

PROFIT AND LOSS.

Net Profit for the year, including £519,708 5s. brought from year 1921	£2,407,729 11 2			
From this the following appropriations have been made :—				
Interim Dividends (less Income Tax) paid in August last	600,223 10 3			
Bank Premises Account	200,000 0 0			
Rebuilding Account	150,000 0 0			
Contingent Fund .	300,000 0 0			
Final Dividends (less Income Tax) payable 1st February		620,920	17	6
Leaving a Balance to carry forward		536,585	3	5
		£310,185,113	15	8

ASSETS.

		£	s.	d.
Coin, Bank and Currency Notes and Balances with the Bank of England ..		32,031,272	17	2
Balances with, and Cheques in course of collection on, other Banks in the United Kingdom		10,469,741	4	0
Money at Call and Short Notice		19,816,166	9	8
Bills Discounted.....		69,327,504	15	5
Investments—				
War Loans and other Securities of, or guaranteed by, the British Government (of which £1,203,677 is lodged for Public Accounts, and for the Note issue in the Isle of Man) ..	52,795,660 11 8			
Colonial Government Securities, British Corporation Stocks, British Railway Debenture Stocks and other investments	2,598,500 4 9			
		55,394,160	16	5
London County Westminster and Parr's Foreign Bank, Ltd.— 8,000 £20 Shares fully paid..... 92,000 £20 Shares, £10 paid	1,080,000 0 0			
Ulster Bank, Ltd.— 199,881 £15 Shares, £2 10s. paid....	1,911,362 1 3			
		2,991,362	1	3
Advances to Customers and other Accounts		106,326,009	3	10
Liability of Customers for Acceptances, Endorsements, etc., as per contra		9,923,238	7	9
Bank and other Premises (at cost, *less* amounts written off)		3,905,658	0	2
		£310,185,113	15	8

WALTER LEAF,
M. C. TURNER,
R. HUGH TENNANT, } *Directors.*

JOHN RAE, *Chief General Manager.*
J. E. JACKSON, *Chief Accountant.*

AUDITORS' REPORT.

We have examined the above Balance Sheet and compared it with the Books at Lothbury, Lombard Street and Bartholomew Lane, and with the Certified Returns received from the Branches.

We have verified the Cash in hand and Bills Discounted at Lothbury, Lombard Street and Bartholomew Lane, and the Cash at the Bank of England.

We have examined the Securities held against Money at Call and Short Notice, and have verified the Investments of the Bank.

We have obtained all the information and explanations we have required, and in our opinion the Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Company's affairs according to the best of our information and the explanations given to us, and as shown by the Books of the Company.

TURQUAND, YOUNGS & CO.,
KEMP, CHATTERIS, NICHOLS, SENDELL & CO.,
PRICE, WATERHOUSE & CO.,
STEAD, TAYLOR & STEAD, } *Chartered Accountants.*

Auditors.

LONDON, 16*th January*, 1923.

Company News

BROKEN HILL PROPRIETARY (BLOCK 10).—A balance at credit of profit and loss of £29,757 is shown in the accounts for the half-year to September 30 last, after deducting a net loss of £6,771.

BROKEN HILL PROPRIETARY (BLOCK 14).—The net loss for the half-year ended September 30 last amounted to £5,201, which with £8,769 written off the value of shares held in the King Island Scheelik Co., reduces the balance at credit of profit and loss account to £4,292.

SOUTH STAFFORDSHIRE MOND GAS CO.—There was a net profit for the year 1922 of £5,177, as compared with a total loss of £31,929 for 1921. During the year the bank overdraft was reduced from £60,492 to £55,992. The directors again do not propose a dividend on the preference shares.

UNITED PREMIER OIL AND CAKE CO., LTD.—The directors announce that the accounts for the year ended December 3 last, will be submitted to shareholders next month. They do not propose to make an interim distribution on the ordinary shares, but to recommend at the ordinary general meeting the payment of a final dividend for the full financial year.

NEW TAMARUGAL NITRATE CO., LTD.—Presiding on January 30, at the annual meeting, Mr. F. G. Lomax, said that after deducting London expenses and provision of tax the trading profit was £62,677. Allowing for the interim dividend of 5 per cent. distributed in July last, the profit and loss account showed a credit balance of £93,492 subject to Corporation profits tax. Out of this sum it was proposed to pay a final dividend of 10 per cent.

ELECTROLYTIC ZINC CO. OF AUSTRALASIA.—A dividend (the third) of 15·77424d. per share on the issue of 1,100,000 8 per cent. cumulative participating preference shares made in March, 1920, has been declared, payable on March 17 to holders registered on February 17. This dividend represents the amount of interest accrued on the above-mentioned issue from the date of allotment to June 30, 1921, at 8 per cent, per annum, 6·1742d. per share, and dividend for half year to December 31, 1922, at 8 per cent. per annum ; 9·6d. per share—15·77424d. per share. Warrants for dividends due to shareholders on the London register, less tax, will be posted direct from the London office. The payment of this dividend completes the distribution of interest on the above issue from allotment to December 31, 1922.

NOBEL INDUSTRIES, LTD.—Underwriting arrangements were made on Wednesday in connection with an offer for sale to be made on Monday next of £1,750,000 5½ per cent. first mortgage debenture stock at 99 per cent. The issue is being made to provide part of the funds required to redeem the £3,000,000 of short-term notes which are to be repaid on May 7 next, the balance being provided by the company out of its own resources. Holders of the notes have the right to take up 50 per cent. of their existing holding in new debenture stock, and a circular has been issued to the noteholders explaining the procedure, because noteholders will not be required to pay any cash. The stock cannot be repaid earlier than 1928, but after May 1 in that year the whole may be redeemed on three months' notice at 103 per cent. between May 1, 1928, and May 1, 1933 ; at 102 per cent. between May 1, 1933, and May 1, 1938 ; and at 100 per cent. any time thereafter.

BORAX CONSOLIDATED, LTD.—The report for the year to September 30 last, states that the profits were £417,900 after providing for all management and administration expenses. Requirements for the debenture interest, the interim dividends on the preference and the preferred ordinary shares, paid May 1, 1922, amounted to £126,157, leaving with the balance brought in, £409,381. To buildings, plant, etc., depreciation reserve, there has been placed £40,000 ; to credit of debenture stock redemption sinking fund, £5,825 ; to balance of income-tax to April 5, 1922, £913, leaving to the credit of profit and loss, £362,643. The payment of final dividends in November last leaves £265,143. The directors propose to pay a final dividend of 1s. 6d. per share on the deferred ordinary shares, making 12½ per cent. for the year, £86,250 to place to general reserve, £25,000 to income-tax reserve accrued to September 30, 1922, £25,000 ; and to pensions and grants fund, £5,000, carrying forward £123,893. The ordinary general meeting will be held at Cannon Street Hotel on February 15, at noon.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. NO.
Australia	Sulphate of copper	D.O.T. 10544/ E.D./C.C./2.
South Africa...	Tar or tar substitutes.	D.O.T. 10551/ E.D./M.C./2.
Italy.....	Chilean nitrate	174
Syria	Potash alum.	187
Peru	Drugs and chemical products.	184
Australia.....	Ammonium chloride.	D.O.T. 10542 E.D./I/C.C./2.
Paris	Pharmaceutical products	171
Sweden	Varnishes and dyestuffs.	185

"Chemical Age" Inquiry List

The following inquiries have been received from readers of "The Chemical Age." Replies addressed to the box number given below, c/o "The Chemical Age," 8, Bouverie Street, London, E.C.4, will be forwarded to the inquirers.

Manufacturers of nitrous oxide gas plant.—No. H.9.

Manufacturers of Xylol with a distillation range of 5°. —No. H.10.

Manufacturers of "Bengal" silver, "Britannia" metal, and "Duralumin."—No. H.11.

Tariff Changes

AUSTRALIA.—A notice issued under the Industries Preservation Act, 1921, applies the special duty authorised under Section 9 of the Act to German analytical balances.

TANGANYIKA.—It is understood that the Customs tariff at present in operation in Kenya has now been enforced in Tanganyika.

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses :

AUSTRALIA (February 20).—Forty tons sulphate of copper (99%, $CuSo_4$. $5H_2o$). Particulars from Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1. Reference No. 15544 E.D./C.C.(2).

SOUTH AFRICA (February 26).—Oxygen supplies for twelve months ending March 31, 1924. Particulars from Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1.

French Potash

ALTHOUGH the demand for immediate delivery of potash salts has not been very considerable during the present month, negotiations for Spring supplies show that potash is in good request. The low prices at which the grades can be offered, especially for consignments ex ship, combined with the more generally recognised necessity for potash manuring, are encouraging merchants to lay in considerable stocks for the Spring season. Requests for immediate deliveries of sylvinites and kainit for early application to the soil are preventing accumulations of stocks of these grades, and buyers are advised to avoid possible delay in execution of orders by estimating their requirements as early as possible. The demand for muriate and sulphate remains steady, with not much prospect of a marked increase. The interest displayed in the finely ground grade of sylvinite, suitable for destruction of charlock in corn crops, indicates that in certain localities there will be a good demand. Prices for all grades remain steady, and there is no indication of a further drop.—*French Potash Mines Information Bureau.*

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BARRITT, E. C., 459, Harrow Road, W., chemist. (C.C., 10/2/23.) £23 3s. 5d. December 13.

BLUNT, W. H., AND SON, 69½–70, Snow Hill, Birmingham, wholesale druggists. (C.C., 10/2/23.) £13 17s. 7d. December 19.

BRAY, G. R. (late trading as W. J. TILTMAN), 51, Milton Avenue, East Ham, chemist. (C.C., 10/2/23.) £25 12s. 9d. December 19.

EVANS, J. W. Hayden, The Pharmacy, Ystrad, chemist. (C.C., 10/2/23.) £27 0s. 3d. December 19.

MAYONS, LTD., R/O, 170, Alum Park Road, Saltley, Birmingham, chemists. (C.C., 10/2/23.) £17 18s. 6d. December 7.

NICHOLLS, F., Dovecote Drug Stores, Dovecote Street, Stockton-on-Tees, druggist. (C.C., 10/2/23.) £16 1s. 1d. December 22.

NOBLE, W. D., 2, Well Street, Cable Street, E., manufacturing chemist. (C.C., 10/2/23.) £37 19s. 7d., December 22; and £16 11s. 6d., December 9.

NORRIS BROS., LTD., R/O, 108–11, Moorgate Station Chambers, E.C., chemical merchants. (C.C., 10/2/23.) £19 6s. 3d., December 16; and £10 17s. 2d., December 12.

Receiverships

GRAHAM AND COPE, LTD. (R., 10/2/23.) J. Croft, of Market Place, Dewsbury, ceased to act as receiver or manager on December 31, 1922.

RADIUM POLISHES, LTD. (R., 10/2/23.) W. G. Hall, of Union and Smiths Bank Chambers, Hull, was appointed receiver on January 19, 1923, under powers contained in debentures dated May 28, 1906.

WESTERN PIGMENT CO., LTD. (R., 10/2/23.) C. D. Bromhead, of Sun Buildings, 59, Bedford Street, Plymouth, was appointed receiver and manager on January 22, 1923, under powers contained in first mortgage debenture dated July 12, 1907.

WHEELDON (JOHN), AND CO., LTD. (R., 10/2/23.) G. E. V. Wood, of Prudential Buildings, Sheffield, was appointed receiver and/or manager on January 20, 1923, under powers contained in debenture dated March 31, 1921.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

DENT, SONS AND CO., LTD., Harrogate, tar distillers, etc. (M., 10/2/23.) Registered January 23, £15,000 1st debenture, to Branch Nominees, Ltd., 15, Bishopsgate, E.C.; charged on properties at Barlby, Leeds, etc., also general charge.

GODDON AND CO., LTD., London, W.C., manufacturing chemists. (M., 10/2/23.) Registered January 26, £3,500 debenture, to J. Dodds, Lancaster Gate Hotel, W.; general charge.

London Gazette

Companies Winding Up Voluntarily

BOYD, WILSON AND CO., LTD. (C.W.U.V., 10/2/23.) A. T. Tidy, Associated and Corporate Accountant, 65, Wellington Street, Woolwich, S.E.18, appointed liquidator.

HULL CARBIDE CO., LTD. (C.W.U.V., 10/2/23.) C. Bingham, 11, Queen Victoria Street, London, E.C.4, appointed liquidator.

New Companies Registered

BITUM-PAINT CO., LTD., Bank Chambers, Barnsley. Manufacturers of and dealers in bitum-paint, pharmaceutical, chemical, industrial and other preparations, etc. Nominal capital, £1,000 in £1 shares.

BRITANNIC OIL STORAGE CO., LTD. Producers, refiners, and distributors of oil, petrol, chemicals and chemical products, grease, etc. Nominal capital, £25,000 in £1 shares. Solicitors: Simmons and Simmons, 18, Finch Lane, E.C.3.

DALTON CHEMICAL WORKS, LTD. Chemical manufacturers and benzol distillers. Nominal capital, £12,000 in £1 shares. A director: C. A. Weymouth, 61, South View Hill Top, Paddock, Huddersfield.

ELCHO CHEMICAL ENGINEERING CO., LTD., 8, Southwell Road, Sheffield. Suppliers and constructors of chemical plant, etc. Nominal capital, £1,500 in £1 shares.

IRWELL CHEMICAL AND GRINDING CO., LTD., 11, Chancery Lane, Bolton. Manufacturers and grinders of and dealers in chemicals, paints, colours, ores and pigments, etc. Nominal capital, £2,000 in £1 shares.

NORTHAMPTON GLUE CO., LTD., Mill Lane, St. James End, Northampton. The objects are as indicated by the title. Nominal capital, £4,000 in £1 shares.

PUKKA PROPRIETORIES, LTD. Dealers in all kinds of oils and their by-products, etc. Nominal capital, £1,000 in £1 shares. A subscriber: H. P. Justie, 5, Idol Lane, London, E.C.3.

THE BRITISH OIL TRADERS' ASSOCIATION, LTD., 139, Fenchurch Street, E.C.3. Agents for and dealers in petroleum products of all kinds. Nominal capital, £600 in £1 shares (100 preference and 500 ordinary).

THE INTERNATIONAL RADIUM SYNDICATE, LTD., 126, Gresham House, 24, Old Broad Street, E.C. The acquisition of certain uranium concessions and properties in Portugal. Nominal capital, £30,000 in £1 shares.

United Alkali Co.'s Staff Changes

CHANGES in the staff of the United Alkali Co., Ltd., rendered necessary by the illness of Mr. Arthur Carey and the resignation of Dr. Raschen, have now been announced. Mr. W. A. Short and Mr. R. Holden Davidson have been appointed to the directorate, and the latter now becomes general technical manager.

Dr. Conroy has been appointed chief chemist in the place of Dr. Raschen, who has been chief chemist of the company for 25 years. The general services of the chemical works in Widnes, St. Helens, and Weston will be directed from the general offices in Widnes, of which Mr. J. H. Smith will be manager.

Dr. Conroy was formerly at the central laboratory, Widnes, and some time ago became assistant district manager. Mr. J. H. Smith has been with the company since leaving school.

A Danish Synthetic Nitrogen Project

THE erection of a factory for the production of synthetic nitrogen has been advocated strongly in Denmark. A committee was appointed some time ago to go into the matter, and in the report recently submitted, states the *Financier*, these experts have come to the conclusion that it would be advisable to erect first an experimental factory with a capacity of 260,000 kilogrammes of ammonia. This would entail an expenditure of a million kroner, while works having a productive capacity of 8,000 tons of nitrogen would call for an outlay of about ten million kroner. The report of the committee is now before the Minister of Agriculture, who is considering the question.